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SESSIONAL PAPERS

VOLUME 19

SIXTH SESSION OF THE TWELFTH PARLIAMENT

OF THE

DOMINION OF CANADA

SESSION 1916

VOLUME LI.

N62tc

ALPHABETICAL INDEX

TO THE

SESSIONAL PAPERS

OF THE

PARLIAMENT OF CANADA

SIXTH SESSION, TWELFTH PARLIAMENT, 1916.

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Fifth Census of Canada, 1911—Volume VI—Occupations of the people.

CONTENTS OF VOLUME 1.

(This volume is bound in three parts.)

1. Report of the Auditor General for the year ended 31st March, 1915, Volume 1, Parts a b and A to L; Volume III, Parts V to Z. Presented by Sir Thomas White, February 7 1916.
Printed for distribution and sessional papers.

1. Report of the Auditor General for the year ended 31st March, 1915, Volume II, Parts M to U. Presented by Sir Thomas White, February 10, 1916.
Printed for distribution and sessional papers.

1. Report of the Auditor General for the year ended 31st March, 1915, Volume IV, part ZZ. Presented by Sir Thomas White, February 14, 1916.
Printed for distribution and sessional papers.

CONTENTS OF VOLUME 2.

2. The Public Accounts of Canada for the fiscal year ending March 31, 1915. Presented by Sir Thomas White, February 1, 1916.. ..*Printed for distribution and sessional papers.*

3. Estimates of sums required for the service of the Dominion for the year ending March 31, 1917. Presented by Sir Thomas White, 1916.
Printed for distribution and sessional papers.

4. Supplementary Estimates of sums required for the service of the Dominion for the year ending March 31, 1916. Presented by Sir Thomas White, 1916.
Printed for distribution and sessional papers.

5. Supplementary Estimates of sums required for the service of the Dominion for the year ending March 31, 1917. Presented by Sir Thomas White, 1916.
Printed for distribution and sessional papers.

5*a*. Further Supplementary Estimates for the service of the Dominion for the year ending March 31, 1917. Presented by Sir Thomas White, 1916.
Printed for distribution and sessional papers.

5*b*. Further Supplementary Estimates for the fiscal year ending March 31, 1917. Presented by Sir Thomas White, May 1916.. .. .. ..*Printed for distribution and sessional papers.*

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6. List of Shareholders in the Chartered Banks of the Dominion of Canada as on December 31, 1915. Presented by Sir Thomas White, February 1, 1916.
Printed for distribution and sessional papers.

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7. Report on certified cheques, drafts or bills of exchange, dividends, remaining unpaid and unclaimed balances in Chartered Banks of the Dominion of Canada, for five years and upwards prior to December 31, 1915. Presented by Sir Thomas White, February 1, 1916.
Printed for distribution and sessional papers.

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(This volume is bound in two parts.)

8. Report of the Superintendent of Insurance for the year 1915. Presented by Sir Thomas White, 1916.. .. ..*Printed for distribution and sessional papers.*

9. Abstract of Statements of Insurance Companies in Canada for the year ended December 31 1915. Presented by Sir Thomas White, April 10, 1916.
Printed for distribution and sessional papers.

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10. Report of the Department of Trade and Commerce for the fiscal year ended March 31, 1915; Part I.—Canadian Trade (Imports in and Exports from Canada). Presented by Sir George Foster, January 13, 1916.. ..*Printed for distribution and sessional papers.*

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10*a*. Report of the Department of Trade and Commerce for the fiscal year ended March 31, 1915: Part II.—Canadian Trade with (1) France, (2) Germany, (3) United Kingdom, (4) United States. Presented by Sir George Foster, 1916.
Printed for distribution and sessional papers.

10*b*. Report of the Department of Trade and Commerce for the fiscal year ended March 31, 1915: Part III.—Canadian Trade with foreign countries (except France, Germany, the United Kingdom and United States). Presented by Sir George Foster, 1916.
Printed for distribution and sessional papers.

10*c*. Report of the Department of Trade and Commerce for the fiscal year ended March 31, 1916; (Part IV.—Miscellaneous Information.) Presented by Sir George Foster, 1916.
Printed for distribution and sessional papers.

10*d*. Report of the Grain Commissioners for Canada. (Part V.) Presented by Sir George Foster, 1916.. .. ..*Printed for distribution and sessional papers.*

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10*e*. Report of the Department of Trade and Commerce for the fiscal year ended March 31, 1915; Part VI.—Subsidized Steamship Services, with statistics showing steamship traffic to December 31, 1915, and Estimates for the fiscal year 1916-17. Presented by Sir George Foster, 1916.. .. ..*Printed for distribution and sessional papers.*

10*f*. Report of Trade and Commerce for the fiscal year ended March 31, 1915: Part VII.—Trade of Foreign Countries, Treaties and Conventions. Presented by Sir George Foster, 1916.
Printed for distribution and sessional papers.

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11. Report of the Department of Customs for the year ended March 31, 1915. Presented by Hon. Mr. Reid, January 18, 1916.. .. ..*Printed for distribution and sessional papers.*

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12, 13, 14. Reports, Returns and Statistics of the Inland Revenue of the Dominion of Canada, for the year ended March 31, 1915. Part I.—Excise. Part II.—Inspection of Weights and Measures, Gas and Electricity. Part III.—Adulteration of Food. Presented by Hon. Mr. Patenaude, February 18, 1916..*Printed for distribution and sessional papers.*

CONTENTS OF VOLUME 11.

15. Report of the Minister of Agriculture for the Dominion of Canada, for the year ended March 31, 1915. Presented by Hon. Mr. Burrell, January 20, 1916.
Printed for distribution and sessional papers.

15a. Report of the Dairy and Cold Storage Commissioner for the fiscal year ending March 31, 1915. (Dairying, Fruit, Extension of Markets and Cold Storage.) Presented by Hon. Mr. Burrell, February 1, 1916.. .. .. ..*Printed for distribution and sessional papers.*

15b. Report of the Veterinary Director General for the year ending March 31, 1915. Presented by Hon. Mr. Burrell, 1916.. .. ..*Printed for distribution and sessional papers.*

15c. Report on "The Agricultural Instruction Act," 1914-15, pursuant to Section 8, Chapter 5 of 3-4 George V. Presented by Hon. Mr. Burrell January 24, 1916.
Printed for distribution and sessional papers.

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16. Report of the Director and Officers of the Experimental Farms for the year ending March 31, 1915. Presented by Hon. Mr. Burrell, January 31, 1916.
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17. Criminal Statistics for the year ended September 30, 1914. (Appendix to the Report of the Minister of Trade and Commerce for the year 1914.) Presented by Sir George Foster, 1916.. .. ..*Printed for distribution and sessional papers.*

18. Return of By-elections for the House of Commons of Canada held during the year 1915. Presented by Hon. Mr. Speaker, 1916.. ..*Printed for distribution and sessional papers.*

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19. Report of the Minister of Public Works on the works under his control for the fiscal year ended March 31, 1915. Presented by Hon. Mr. Rogers, January 13, 1916.
Printed for distribution and sessional papers.

19a. Ottawa River Storage for year 1915.. .. ..*Printed for distribution and sessional papers.*

19b. Interim Report of the Commission appointed to examine into certain general conditions of Transportation bearing on the economic problem of the proposed Georgian Bay Canal. Presented by Hon. Mr. Rogers, April 14, 1916.
Printed for distribution and sessional papers.

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20. Annual Report of the Department of Railways and Canals, for the fiscal year from April 1, 1914, to March 31, 1915. Presented by Hon. Mr. Cochrane, February 2, 1916.
Printed for distribution and sessional papers.

20a. Canal Statistics for the season of navigation, 1915. Presented by Hon. Mr. Reid, May 17, 1916.. .. ..*Printed for distribution and sessional papers.*

20b. Railway Statistics of the Dominion of Canada, for the year ended June 30, 1915. Presented by Hon. Mr. Cochrane, April 4, 1916.. ..*Printed for distribution and sessional papers.*

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20c. Tenth Report of the Board of Railway Commissioners for Canada, for the year ending March 31, 1915. Presented by Hon. Mr. Cochrane, February 2, 1916.
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20d. Telephone Statistics of the Dominion of Canada, for the year ended June 30, 1915. Presented by Hon. Mr. Cochrane, April 13, 1915.
Printed for distribution and sessional papers.

20e. Express Statistics of the Dominion of Canada, for the year ended June 30, 1915. Presented by Hon. Mr. Cochrane, April 13, 1916.. ..*Printed for distribution and sessional papers.*

20f. Telegraph Statistics of the Dominion of Canada, for the year ended June 30, 1915. Presented by Hon. Mr. Cochrane, May 16, 1916.
Printed for distribution and sessional papers.

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21. Forty-eighth Annual Report of the Department of Marine and Fisheries, for the year 1914-1915.—Marine. Presented by Hon. Mr. Hazen, January 13, 1916.
Printed for distribution and sessional papers.

22. List of Shipping issued by the Department of Marine and Fisheries, being a list of vessels on the registry books of the Dominion of Canada on December 31, 1915. Presented by Hon. Mr. Hazen, 1916.. .. ..*Printed for distribution and sessional papers.*

23. Supplement to the Forty-eighth Annual Report of the Department of Marine and Fisheries for the fiscal year 1914-15. Marine.—Steamboat Inspection Report.
Printed for distribution and sessional papers.

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24. Report of the Postmaster General for the year ended March 31, 1915. Presented by Hon. Mr. Casgrain, January 13, 1916.. .. ....*Printed for distribution and sessional papers.*

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25. Annual Report of the Department of the Interior for the fiscal year ending March 31, 1915. Presented by Hon. Mr. Roche, January 13, 1916.
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25*b*. Annual Report of the Topographical Surveys Branch of the Department of the Interior, 1914-15. Presented by Hon. Mr. Roche, May 1, 1916.
Printed for distribution and sessional papers.

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25*c*. Report of progress of stream measurements for the calendar year 1915. Presented by Hon. Mr. Roche, 1916.. .. ..*Printed for distribution and sessional papers.*

25*d*. Fourteenth Report of the Geographic Board of Canada for year ended March 31, 1915.
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25*e*. British Columbia Hydrographic Surveys .. ..*Printed for distribution and sessional papers.*

25*f*. Manitoba Hydrographic Surveys, 1912-14.. ..*Printed for distribution and sessional papers.*

25*g* Report of the Chief Medical Officer Department of the Interior, for 1915.
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26. Summary Report of the Geological Survey Department of Mines, for the calendar year 1914. Presented by Hon. Mr. Roche, 1916.
Printed for distribution and sessional papers.

26*a*. Summary Report of the Mines Branch for the calendar year 1914. Presented by Hon. Mr. Roche, 1916.. .. ..*Printed for distribution and sessional papers.*

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27. Report of the Department of Indian Affairs for the year ended March 31, 1915. Presented by Hon. Mr. Roche, January 19, 1916..*Printed for distribution and sessional papers.*

28. Report of the Royal Northwest Mounted Police, 1915. Presented by Sir Robert Borden, January 19, 1916.. .. ..*Printed for distribution and sessional papers.*

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29. Report of the Secretary of State of Canada for the year ended March 31, 1915. Presented by Hon. Mr. Blondin, February 28, 1916.
Printed for distribution and sessional papers.

29*a*. Report of the work of the Public Archives for the year 1914. Presented, 1916.
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30. The Civil Service List of Canada for 1915. Presented by Hon. Mr. Patenaude 1916.
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31. Annual Report of the Civil Service Commission of Canada for the year ended August 31, 1915. Presented by Hon. Mr. Patenaude, 1916.
Printed for distribution and sessional papers.

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32. Annual Report of the Department of Public Printing and Stationery for the fiscal year ended March 31, 1915. Presented by Hon. Mr. Blondin, March 20, 1916.
Printed for distribution and sessional papers.

33. Report of the Secretary of State for External Affairs for the year ended March 31, 1915. Presented by Sir Robert Borden, February 23, 1916.
Printed for distribution and sessional papers.

34. Report of the Minister of Justice as to Penitentiaries of Canada for the fiscal year ending March 31, 1915.. .. ..*Printed for distribution and sessional papers.*

35. Report of the Militia Council for the Dominion of Canada, for the fiscal year ending March 31, 1915. Presented by Sir Sam Hughes, February 21, 1916.
Printed for distribution and sessional papers.

35a. Employment for the Expeditionary Forces after the war. Presented, 1916.
Printed for distribution and sessional papers.

36. Report of the Department of Lahour for the fiscal year ending March 31, 1915. Presented by Hon. Mr. Crothers, January 25, 1916.
Printed for distribution and sessional papers.

36a. Eighth Report of the Registrar of Boards of Conciliation and Investigations of the proceedings under "The Industrial Disputes Investigation Act, 1907," for the fiscal year ending March 31, 1915. Presented by Hon. Mr. Crothers, January 25, 1916.
Printed for distribution and sessional papers.

CONTENTS OF VOLUME 27.

37. Eleventh Annual Report of the Commissioners of the Transcontinental Railway, for the year ended March 31, 1914. Presented by Hon. Mr. Cochrane, February 2, 1916.
Printed for distribution and sessional papers.

38. Report of the Department of the Naval Service, for the fiscal year ending March 31, 1915. Presented by Hon. Mr. Hazen, January 13, 1916.
Printed for distribution and sessional papers.

38a. Supplement to the Report of the Naval Service—Contributions to Canadian Biology, 1914-15. Presented by Hon. Mr. Hazen, 1916.
Printed for distribution and sessional papers.

38b. Natural History of the Herring. Presented, 1916.
Printed for distribution and sessional papers.

39. Forty-eighth Annual Report of the Fisheries Branch of the Department of the Naval Service, 1914-1915. Presented by Hon. Mr. Hazen, January 13, 1916.
Printed for distribution and sessional papers.

40. The Report of the Joint Librarians of Parliament. Presented by Hon. Mr. Speaker, January 13, 1916.. .. ..*Not printed.*

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41. Copies of Orders in Council authorizing Regulations for the Department of Naval Service in accordance with Section 47, Chapter 43, 9-10 Edward VII, as follows:—

P.C. 2864, dated the 4th December, 1915, Payment of Separation Allowance in the case of Warrant Officers.

P.C. 3009, dated 21st December, 1915, with reference to application of the Naval Discipline Act, etc., for the Government of the Naval Volunteer Force.

P.C. 63/422, dated 15th October, 1915, with reference to appointment of Assistant Paymasters in charge.

P.C. 2267, dated 25th September, 1915, with reference to regulations for payment of "Detained Pay."

P.C. 93/2151, dated 17th September, 1915, with reference to allowances to officers and men employed on coding and decoding duties, etc.

P.C. 1712, dated 21st July, 1915, with reference to scheme of pensions for officers and men of the Royal Canadian Forces, etc.

CONTENTS OF VOLUME 28—*Continued.*

P.C. 748, dated 13th April, 1915, with reference to institution of the ratings of rangetaker first and second class in the Royal Canadian Navy.

P.C. 58/1470, dated 24th June, 1915, with reference to increase in amount of Separation Allowance to a motherless child from 3s. to 5s.

P.C. 85/1158, dated 20th May, 1915, with reference to revision of amounts payable on account of Separation Allowance to dependents of Royal Canadian Naval Permanent Ratings.

P.C. 756, dated 13th April, 1915, with reference to payment of Allowances to officers of the Royal Naval Canadian Volunteer Reserve for performance of duties which carry with them an Allowance to officers of the Royal Canadian Navy. Presented by Hon. Mr. Hazen, January 17, 1916.. .. ..*Not printed.*

42. Copies of Proclamations, Orders in Council and Documents relating to the European War. Presented by Sir Robert Borden, January 18, 1916.. .. ..*Not printed.*

42*a*. First Supplement to Copies of Proclamations, Orders in Council and Documents relating to the European War. Presented by Sir Robert Borden, January 18, 1916..*Not printed.*

43. Orders in Council relating to the European War, from 29th April, 1915, to 12th January, 1916, both inclusive. Presented by Sir Robert Borden, January 18, 1916..*Not printed.*

44. Copy of New Rules of Court passed by the Judges of the Supreme Court of Alberta, under the authority of Section 576 of the Criminal Code, at meeting of 27th November, 1915. Presented by Hon. Mr. Meighen, January 20, 1916.. .. ..*Not printed.*

45. Account of the average number of men employed on the Dominion Police Force during each month of the year 1915, and of their pay and travelling expenses, pursuant to Chapter 92, Section 6, Subsection 2, of the Revised Statutes of Canada. Presented by Hon. Mr. Doherty, January 20, 1916.. .. ..*Not printed.*

46. Regulations under "The Destructive Insect and Pest Act," pursuant to Section 9, Chapter 31 of 9-10 Edward VII. Presented by Hon. Mr. Burrell, January 24, 1916...*Not printed.*

47. Return of Orders in Council which have been published in the *Canada Gazette* and in the British Columbia *Gazette*, between 12th January, 1915, and the 31st December, 1915, in accordance with provisions of Subsection (*d*) of Section 38 of the regulations for the survey, administration, disposal and management of Dominion Lands within the 40-mile Railway Belt in the Province of British Columbia. Presented by Hon. Mr. Roche, January 25, 1916.. .. ..*Not printed.*

48. Return of Orders in Council which have been published in the *Canada Gazette*, between 12th January, 1915, and the 31st December, 1915, in accordance with the provisions of Section 77 of "The Dominion Lands Act," Chapter 20 of the Statutes of Canada, 1908. Presented by Hon. Mr. Roche, January 25, 1916.. .. ..*Not printed.*

49. Return of Orders in Council which have been published in the *Canada Gazette*, between the 16th January, 1915, and the 31st December, 1915, in accordance with the provisions of "The Forest Reserves and Park Act," Section 19 of Chapter 10, 1-2 George V. Presented by Hon. Mr. Roche, January 25, 1916.. .. ..*Not printed.*

50. Return of Orders in Council which have been published in the *Canada Gazette*, between the 12th January, 1915, and the 31st December, 1915, in accordance with the provisions of Section 5 of "The Dominion Lands Survey Act," Chapter 21, 7-8 Edward VII. Presented by Hon. Mr. Roche, January 25, 1916.. .. ..*Not printed.*

51. Return of Orders in Council which have been published in the *Canada Gazette*, between the 12th January, 1915, and the 31st December, 1915, in accordance with the provisions of Chapter 47, 2 George V, entitled "The Railway Belt Water Act." Presented by Hon. Mr. Roche, January 25, 1916.. .. ..*Not printed.*

52. Return of Orders in Council passed between the 16th January, 1915, and the 31st December, 1915, approving of regulations and forms prescribed in accordance with the provisions of Section 57 of the Irrigation Act, Chapter 61, Revised Statutes of Canada, 1906, as amended by Chapter 38, 7-8 Edward VII. Presented by Hon. Mr. Roche, January 25, 1916.. .. ..*Not printed.*

53. Return of Orders in Council passed under the provisions of Section 18 of Chapter 63, Revised Statutes of Canada, "An Act to provide for the Government of the Yukon Territory." Presented by Hon. Mr. Roche, January 25, 1916.. .. ..*Not printed.*

54. Return showing lands sold by the Canadian Pacific Railway Company during the year which ended on the 30th September, 1915. Presented January 25, 1916...*Not printed.*

CONTENTS OF VOLUME 28—*Continued.*

55. Return called for by Section 88 of Chapter 62, Revised Statutes of Canada, requiring that the Minister of the Interior shall lay before Parliament, each year, a return of liquor brought from any place out of Canada into the Territories by special permission in writing of the Commissioner of the Northwest Territories. Presented by Hon. Mr. Roche, January 25, 1916.. .. .. .

CONTENTS OF VOLUME 28—*Continued.*

72. Certified copy of a report of the Committee of the Privy Council, approved by His Royal Highness the Governor General on the 7th February, 1916, appointing Robert A. Pringle, of the city of Ottawa, one of His Majesty's counsel learned in the law, and His Honour D. B. MacTavish, Judge of the County Court for the County of Carleton, a Commission, under the Inquiries Act, to conduct an inquiry into and concerning the origin of the recent disastrous fire which destroyed the Parliament Buildings at Ottawa. Presented by Sir Robert Borden, February 7, 1916.. .. ..*Not printed.*

72a. Report of the Royal Commission appointed to inquire into the origin of the fire which destroyed the Central Parliament Building at Ottawa, on Thursday, 3rd February, 1916. Also copy of evidence taken before the Royal Commission appointed to inquire into the origin of the fire which destroyed the Central Parliament Building at Ottawa, on Thursday, 3rd February, 1916. Presented by Hon. Mr. Rogers, May 16, 1915.
Printed for sessional papers only.

73. Copy of Order in Council, No. P.C. 162, dated 29th January, 1916,—Establishment of the rank of wireless óperator in the Royal Naval Canadian Volunteer Reserve and regulations for the proper government thereof. Presented by Hon. Mr. Hazen, February 7, 1916.. .. ..*Not printed.*

74. Copy of Orders in Council, No. P.C. 183, dated 31st January, 1916,—Regulations governing the payment of allowance to officers of the Royal Canadian Naval Service acting as interpreters. Presented by Hon. Mr. Hazen, February 7, 1916.. .. ..*Not printed.*

74a. Copy of Order in Council No. P.C. 54 601, dated 16th March, 1916, authorizing payment of messing allowance to Royal Naval Reserve Officers. Presented by Hon. Mr. Hazen, March 29, 1916.. .. ..*Not printed.*

75. Communication from the Acting High Commissioner for Canada in London, Sir George Perley, enclosing a report on the Canadian Hospital at Dinard by Dr. Rallier du Baty, Chief Surgeon at the said hospital. Presented by Sir Robert Borden, February 7, 1916.
Printed for sessional papers only.

76. A communication from the Right Honourable A. Bonar Law, Colonial Secretary, to His Royal Highness the Governor General, enclosing a copy of the Imperial Parliamentary Debates (House of Commons, 10th January) on a resolution which was adopted by that House, as follows:—"That with a view to increasing the power of the Allies in the prosecution of the war, His Majesty's Government should enter into immediate consultation with the Governments of the Dominions in order with their aid to bring the whole economic strength of the Empire into co-operation with our Allies in a policy directed against the enemy." Presented by Sir Robert Borden, February 7, 1916.
Printed for distribution and sessional papers

77. Correspondence between the Canadian Manufacturers' Association and the Prime Minister 1914-1915. Presented by Sir Robert Borden, February 7, 1916.. .. .. ..*Not printed.*

78. Correspondence between the International Nickel Company and the Prime Minister. Presented by Sir Robert Borden, February 7, 1916.. .. ..*Not printed.*

79. Return to an Order of the House of the 7th February, 1916, for a copy of all correspondence and reports on the claims of Sealers of British Columbia under the last treaty with the American Republic. Presented February 9, 1916.
Printed for sessional papers only.

80. Certified copy of a report of the Committee of the Privy Council, approved by His Royal Highness the Governor General on the 15th April, 1915, giving authority for the renewal, from the 31st March, 1916, of the agreement between the Dominion Government and the Province of Alberta for the service of the Royal Northwest Mounted Police in that province. Presented by Sir Robert Borden, February 10, 1916.
Printed for sessional papers only.

81. Certified copy of a report of the Committee of the Privy Council, approved by His Royal Highness the Governor General on the 21st May, 1915, giving authority for the renewal, from the 31st March, 1916, of the agreement between the Dominion Government and the province of Saskatchewan, for the services of the Royal Northwest Mounted Police in that province. Presented by Sir Robert Borden, February 10, 1916.
Printed for sessional papers only.

82. Return to an Order of the House of the 8th February, 1916, for a copy of all letters, papers, and other documents relating to the application of Wasyl Pinianski for the patent of the southwest quarter section 5, township 25, range 4, west second principal meridian, Office File No. 1752484. Presented February 16, 1916.—*Mr. MacNutt*... ..*Not printed.*

CONTENTS OF VOLUME 28—*Continued.*

83. Return to an Order of the House of the 3rd February, 1916, for a copy of all affidavits, letters, telegrams and other correspondence during the years 1914 and 1915 in reference to the S.E. 7-1-13 west 2nd meridian, now the 160-acre homestead of Frank Strubell, between the Department of the Interior or the Minister, or any officer of the Department and the Land Office at Weyburn and Estevan, and with all parties who endeavoured to secure or assisted in securing homestead entry for the said land. Presented February 16, 1916.—*Mr. Turriff*.. .. ..*Not printed.*

84. Report of the Board of Inquiry appointed to make an investigation into the increase in the cost of living in Canada and the causes which have occasioned or contributed to such result. Presented by February 16, 1916.. .. .. ..*Printed for distribution.*

84*a*. Synopsis of exhibit by the Statistical Branch, Department of Labour, laid before the Board of Inquiry into the Cost of Living, 1915. Presented by Sir Robert Borden, February 29, 1916.. .. ..*Printed for distribution.*

85. Report of delegation representing the Government of Canada at the Ninth Annual Congress held under the auspices of the World's Purity Federation at San Francisco, July 18-24, 1915. Presented by Sir Robert Borden, February 16, 1916.. .. ..*Not printed.*

86. Return to an Address to His Royal Highness the Governor General, of the 7th February, 1916, for a copy of all Orders in Council, letters and correspondence which led to the convening of the conference of local governments which took place in Ottawa during the month of October last; together with all the proceedings and resolutions of the said conference. Presented February 17, 1916.—*Sir Wilfrid Laurier*.. .. .. ..*Not printed.*

87. Return to an Order of the House of the 3rd February, 1916, for a copy of all letters, telegrams and other documents relating to the purchase by the Government of the several parcels of land now comprised in the Experimental Farm at Rosthern, Saskatchewan. Presented February 22, 1916.—*Mr. McCraney*.. .. ..*Not printed.*

88. Return to an Order of the House, of the 7th February, 1916, for a return showing the names and post office addresses of all applicants for bounty under the Deep Sea Fisheries Act, from the districts of Ecum Secum, Marie Joseph, Spanish Ship Bay, and Liscombe, county of Guysborough, N.S., for the years 1912, 1913, 1914 and 1915, distinguishing between applications that have been accepted and the bounty paid, and those that have been rejected, and also the reasons for such rejections, if any. Presented February 22, 1916.—*Mr. Sinclair*.. .. ..*Not printed.*

89. Return to an Order of the House of the 3rd February, 1916, for a return showing the fractional areas of homestead lands, or otherwise, in the province of Saskatchewan, sold in the year 1915, the name of the purchaser, and the price paid in each case. Presented February 22, 1916.—*Mr. Martin (Regina)*.. .. ..*Not printed.*

90. Return to an Order of the House, of the 7th February, 1916, for a return showing a copy of the prospectus, rates of interest, the effective interest, the net yield, commission charges, printing charges and other charges, in connection with the Government Domestic Loan of one hundred million dollars, and also in connection with the loan of forty-five million dollars made at New York in 1915. Presented February 22, 1916.—*Mr. Maclean (Halifax)*.. .. ..*Not printed*

91. Return to an Order of the House of the 7th February, 1916, for a return showing the number of subscribers in the Government Domestic Loan of one hundred million dollars which were in the sum of $1,000 or under, and the number of other subscriptions in multiples of $1,000. Presented February 22, 1916.—*Mr. Maclean (Halifax)*.
Not printed.

92. Return to an Order of the House of the 8th March, 1915, for a return showing:—1. From how many firms or private individuals the Government, or any Department of the Government, has ordered trousers, breeches, and pantaloons since the 1st of July, 1914? 2. The names of these firms? 3. How many trousers, breeches and pantaloons have been ordered from each firm? 4. How many each firm has delivered up to date? 5. How many each firm has yet to deliver? 6. The price each firm is receiving for these trousers, breeches and pantaloons. Presented February 24, 1916.—*Mr. Chisholm (Inverness)* .. ..*Not printed.*

93. Return to an Order of the House of the 8th March, 1915, for a return showing the number of appointments to the Inside Service and to the Outside Service since October, 1911, of persons resident in the county of Wright, the number of dismissals from the service since October, 1911; the number of resignations from the service since above date; with the names of parties at whose request such resignations, if any, were tendered. Presented February 24, 1916.—*Mr. Devlin*.. .. ..*Not printed.*

CONTENTS OF VOLUME 28—*Continued.*

94. Return to an Order of the House of the 8th April, 1915, for a return showing:—1. The names of the persons who have successfully passed the Civil Service examination in the province of Quebec since the establishment of the Civil Service Commission. 2. The number of such persons who have been called upon to enter the Civil Service. 3. The number in each grade of those who have pased such examinations with success. Presented February 24, 1916.—*Mr. Boulay*.. .. ..*Not printed.*

95. Return to an Order of the House of the 3rd February, 1916, for a copy of all documents, papers and telegrams in any way referring to the application of Aenas McKinnon, of Iron Mines, Inverness County, for the Fenian Raid Veteran Bounty. Presented February 24, 1916.—*Mr. Chisholm (Inverness)*.. .. ..*Not printed.*

95*a*. Return to an Order of the House of the 14th February, 1916, for a copy of all telegrams, letters, petitions and documents of any kind, referring in any way to the application of Anes or Angus McKinnon, of Iron Mines or Orangedale, Inverness County, for the Fenian Raid Bounty. Presented March 3, 1916.—*Mr. Chisholm (Inverness).*
Not printed.

96. Return to an Order of the House of the 15th March, 1915, for a copy of the claim of Captain Stephen Paul, owner of the steamer *Rhoda*, for the destruction of his ship, as a wreckage, by the Department of Marine, and of all correspondence with regard to the same. Presented February 24, 1916.—*Sir Wilfrid Laurier*.. .. ..*Not printed.*

97. Return to an Order of the House of the 29th March, 1915, for a copy of all letters and telegrams, or any other written communications which passed between the Minister of Railways and Canals and J. C. Douglas, Esq., M.P.P., of Glace Bay, Nova Scotia, between the 1st of January and the last of December, 1914, and of all letters and telegrams between the Minister of Customs and Public Works, and the Postmaster General, and the said J. C. Douglas during the above period, in respect to the dismissal, appointment or restoration to office of Government officials. Presented February 24, 1916.—*Mr. McKenzie*.. .. ..*Not printed.*

98. Return to an Order of the House of the 3rd February, 1916, for a copy of all reports upon the depths of water in the different locks in the East River of Pictou, improvements, and of all correspondenee and recommendations in regard to changes on the plans therefor. Presented February 24, 1916.—*Mr. Macdonald*.. .. ..*Not printed.*

98*a*. Supplementary return to an Order of the House of the 3rd February, 1916, for a copy of all reports upon the depths of water in the different locks in the East River of Pictou, improvements, and of all correspondenee and recommendations in regard to changes on the plans therefor. Presented March 13, 1916.—*Mr. Macdonald*.. .. ..*Not printed.*

99. Return to an Order of the House of the 3rd February, 1916, for a copy of all letters, telegrams, petitions and other papers relative to the granting of a Conciliation Board to the employees of the Acadia Coal Company, in the county of Pictou, in the autumn of 1915. Presented February 24, 1916.—*Mr. Macdonald*.. .. ..*Not printed.*

100. Return to an Order of the House of the 1st March, 1915, for a return showing the number of miles of telegraph lines, and the locations, erected in the county of Inverness, each year since 1896, to the present day, with the cost of each line. Presented February 24, 1916.—*Mr. Chisholm (Inverness)*.. .. ..*Not printed.*

101. Return to an Order of the House of the 3rd February, 1916, for a copy of all tenders, letters, telegrams and contracts relative to a mail contract from Noel to Maitland, in the county of Hants, and relative to the warding of the same under contract. Presented February 24, 1916.—*Mr. Macdonald*.. .. ..*Not printed.*

102. Return to an Order of the House of the 22nd March, 1915, for a copy of the petition addressed to the Post Office Department for the establishment of the rural mail delivery route in the county of Shefford, known as Warden No. 1, and of all letters, telegrams reports and other communications connected therewith. Presented February 24, 1916.—*Mr. Boivin*.. .. ..*Not printed.*

103. Return to an Order of the House of the 9th February, 1916, for a return showing the different rural mail routes in the Strathcona constituency, their location and date of establishment, and all rural routes under consideration at the present time. Presented February 24, 1916.—*Mr. Douglas*.. .. ..*Not printed.*

103*a*. Return to an Order of the House of the 16th February, 1916, for a return showing the location of all rural mail routes in the present constituency of Strathcona, the date of their inception, and the location of routes at present under consideration. Presented February 24, 1916.—*Mr. Douglas*.. .. ..*Not printed.*

104. Return to an Order of the House of the 25th March, 1915, for a copy of all letters, papers, petitions, reports and other documents relating to the establishment of a rural mail delivery route, for the purpose of giving postal service to the districts of Hodson and Toney Mills, county of Pictou. Presented February 24, 1916.—*Mr. Macdonald.*
Not printed.

CONTENTS OF VOLUME 28—*Continued.*

105. Return to an Order of the House of the 3rd February, 1916, for a copy of all correspondence, letters, telegrams and memorials received by the Honourable Postmaster General or the Right Hon. Sir Robert L. Borden, since January 1, 1912, relating to the contract for carrying the mail across Lemon Ferry, in the county of Richmond, N.S., and also of all replies thereto. Presented February 24, 1916.—*Mr. Kyte*.. .. ..*Not printed.*

106. Return to an Order of the House of the 7th February, 1916, for a return showing how many rural mail delivery routes have been opened during the last fiscal year, in what counties, and at what cost in each county. Presented February 24, 1916.—*Mr. Lemieux.* *Not printed.*

107. Return to an Order of the House of the 7th February, 1916, for a copy of all correspondence between the Department of Marine and Fisheries, or any department of Government, and the Pilot Commissioners of the harbour and district of St. Anns, in the county of Victoria, during the years 1914 and 1915, in respect to the removal or dismissal of Daniel Buchanan from the office of pilot of said harbour or district. Presented February 24, 1916.—*Mr. McKenzie*.. .. ..*Not printed.*

108. Return to an Order of the House of the 5th April, 1915, for a copy of all documents, letters, correspondence, messages, reports, etc., relating to the calls for tenders for the carrying of the mails between the post office at St. Français de Montmagny and the Intercolonial Station during the years 1914 and 1915, as well as a copy of the tenders that have been sent in relating to the said mail service. Presented February 24, 1916.—*Mr. Lapointe (Kamouraska)*.. .. ..*Not printed.*

109. Return to an Order of the House of the 3rd February, 1916, for a copy of all correspondence, memorials, letters and telegrams received by the Honourable Postmaster General or the Right Hon. Sir Robert L. Borden, in 1915, relating to the contract for carrying the mails between Roberta, in the county of Richmond, and West Bay, in the county of Inverness, N.S., and also of all replies thereto. Presented February 24, 1916.—*Mr. Kyte*.. .. ..*Not printed.*

110. Return to an Order of the House of the 3rd February, 1916, for a copy of all letters, tenders, advertisements, posters, telegrams, and of all other documents in connection with the letting of the contract for conveying the mails between Medicine Hat and Eagle Butte, in the constituency of Medicine Hat, Alberta. Presented February 24, 1916.—*Mr. Buchanan*.. .. ..*Not printed.*

111. Return to an address to His Royal Highness the Governor General, of the 7th February, 1916, for a copy of all correspondence, evidence, official reports, memoranda and Orders in Council, in connection with an investigation or inquiry into the conduct of any officials of the customs service at the Port of Halifax, N.S., in the latter part of 1915, by Mr. Busby, Inspector of Customs. Presented February 25, 1916.—*Mr. Maclean (Halifax)*.. .. ..*Not printed.*

112. Return to an Order of the House of the 7th February, 1916, for a return showing the total amount of duties rebated to importers during the present fiscal year up to December 31, 1915, with the particulars thereof. Presented February 25, 1916.—*Mr. Maclean (Halifax)*.. .. ..*Not printed.*

113. Return to an address to His Royal Highness the Governor General, of the 7th February, 1916, for a copy of all correspondence, inquiries, evidence, reports by departmental officials or Orders in Council, relative to the dismissal of Clifford G. Brander of the Customs Preventive Service at Halifax, N.S. Presented February 25, 1916.—*Mr. Maclean (Halifax)*.. .. ..*Not printed.*

114. Return to an Order of the House of the 7th February, 1916, for a copy of all correspondence, telegrams, or other communications between the officers of the customs at North Sydney, N.S., or any of them, and the Department of Customs, in respect to the renting of a room or rooms for the purposes of the said department at North Sydney. Presented February 25, 1916.—*Mr. Mackenzie (Halifax)*.. .. ..*Not printed.*

115. Return to an Order of the House of the 7th February, 1916, for a return showing the revenue collected during the present fiscal year up to 31st December, 1915, from the importation of the following classes of dutiable articles, and under the divisions of General Tariff, Preferential Tariff, and Surtax Tariff, together with the quantities and values of such importations: iron ore, iron and steel and manufactures of iron and steel; cotton and cotton manufactures; leather and manufactures of leather; wool and manufactures of wool; coal, manganese; zinc; copper; meats; eggs and butter.

Where any of the above items are numerously subdivided in the customs return, the principal items of imports as to quantity, value and revenue need only be given. Presented February 25, 1916.—*Mr. Maclean (Halifax)*.. .. ..*Not printed.*

116. Return to an address to His Royal Highness the Governor General, of the 7th February, 1916, for a copy of all correspondence, evidence, reports, memoranda and Orders in Council relative to the dismissal of Charles McCarthy from the customs service at the Port of Halifax, and in respect to his restoration to office. Presented February 25, 1916. —*Mr. Maclean (Halifax)*.. .. ..*Not printed.*

CONTENTS OF VOLUME 28—*Continued.*

117. Return to an address to His Royal Highness the Governor General of the 7th February, 1916, for a copy of all evidence, reports, memoranda or Orders in Council, relative to the retirement or dismissal from the customs service at the Port of Halifax, of A. J. Crosby, Thomas Lynch and J. B. Naylor. Presented February 25, 1916.—*Mr. Maclean (Halifax)* .. .. ..

CONTENTS OF VOLUME 28—*Continued.*

131. Return to an Order of the House of the 7th February, 1916, for a copy of all letters, telegrams, evidence of witnesses at the investigation, and reports thereon, in relation to the claim of Alexandre D. Doucet, of Beresford, N.B., for cattle killed on the Intercolonial Railroad on May 25, 1915. Presented March 1, 1916.—*Mr. Turgeon.*
Not printed.

132. Return to an Order of the House of the 3rd February, 1916, for a copy of all letters, telegrams, correspondence and agreements between the Department of Railways and Canals, and any official thereof, including the officials of the Intercolonial Railway, regarding the installation of the McQueen Siding, so-called, at Shediac, in the province of New Brunswick, and the subsequent removal thereof. Presented March 1, 1916.—*Mr. Carvell*.. .. .. .

CONTENTS OF VOLUME 28—*Continued.*

141. Return to an Order of the House of the 7th February, 1916, for a return of all sums of money expended, respectively, during the present fiscal year by the Department of Public Works, chargeable to capital account, for public buildings and harbours and rivers, by provinces, designating in detail the purposes of such expenditure. Presented March 1, 1916.—*Mr. Maclean (Halifax)*.. .. ..*Not printed.*

142. Return to an Order of the House of the 3rd February, 1916, for a copy of all letters, telegrams and other documents in connection with the purchase of a site for the post office building at Bear River, N.S. Presented March 1, 1916.—*Mr. Law*.. .. .. ..*Not printed.*

143. Return to an Order of the House of 7th February, 1916, for a copy of all letters, papers, telegrams, pay-sheets, pay-rolls, receipts and documents of all kinds whatsoever in connection with the extension or repairs on the public breakwater at Port Morien, in South Cape Breton, during 1915. Presented March 1, 1916.—*Mr. Carroll*.. .. .. ..*Not printed.*

144. Return to an Order of the House of 16th February, 1916, for a copy of all letters, telegrams and correspondence between the Department of Marine and Fisheries, or any official thereof, and any person or persons in reference to the proposed retirement from office of the present keeper of the lighthouse at Cape Jourmain, in the county of Westmorland. Presented March 1, 1916.—*Mr. Copp*.. .. ..*Not printed.*

145. Return to an Order of the House of 7th February, 1916, for a copy of all correspondence between the Department of Militia and Defence or any of its branches, and the Department of Agriculture, in reference to the using of the immigration or quarantine buildings at McNab's Island and Lawlor's Island, Halifax, N.S., for military purposes, and particularly for their use by the 63rd Regiment, Overseas Contingent. Presented March 1, 1916.—*Mr. Maclean (Halifax)*.. .. ..*Not printed.*

146. Return to an Order of the House of 7th February, 1916, for a return showing the names of all medical officers appointed and employed for immigration or quarantine purposes at Halifax, St. John, Quebec, Montreal, Toronto, Winnipeg, Regina, Calgary, Edmonton, Vancouver and Victoria, together with the date of appointment of each, their salary, and in each case designating whether they or any of them are still in the service of the Government, and when not, the date when the service ceased. Presented March 1, 1916. —*Mr. Maclean (Halifax)*.. .. ..*Not printed.*

147. Return to an Order of the House of the 3rd February, 1916, for a return showing:—1. The names of the different tenderers for the carrying of the mails from the rural boxes established in the counties of l'Assomption and Montcalm down to the present day. 2. The figure of each of such contracts, and the name of the tenderer to whom each of such contracts has been awarded, and for what sum. 3. If any contracts were given without tender. If so, to whom, and for what amount. Presented March 2, 1916.—*Mr. Seguin*.. .. ..*Not printed.*

148. Return to an Order of the House of the 21st February, 1916, for a copy of all correspondence and telegrams exchanged between the Labour Department and the workingmen at Thetford Mines prior, during, or after the last strike in that vicinity, and of all other papers relating thereto. Presented March 2, 1916.—*Mr. Verville*.. .. .. ..*Not printed.*

149. Fenian Raid Bounties—to whom paid in Queens County, N.S.—(*Senate*).. ..*Not printed.*

150. Return to an Address to His Royal Highness the Governor General, of the 3rd February, 1916, for a copy of all Orders in Council passed since 4th August, 1914, dealing with members of the Canadian Expeditionary Forces in the following particulars: Pensions to partially or totally disabled soldiers or their dependents; money allowances or other provision made for the support or care of partially or totally disabled returned soldiers; and pay allowances or other consideration to dependents of soldiers while on active service, and after their return from active service, because of disablement from any cause. Presented March 3, 1916.—*Mr. Oliver*.. .. ..*Printed for sessional papers only.*

151. Return to an Order of the House of the 3rd February, 1916, for a return showing the names of all medical officers employed and designated in the years 1914 and 1915, in the examination of recruits in the county of Pictou, and of any changes in the list of said officers in said period. Presented March 3, 1916.—*Mr. Macdonald*.. ..*Not printed.*

152. Return to an Order of the House of the 4th March, 1915, for a return showing the names and addresses of all persons in Annapolis and Digby Counties, Nova Scotia, to whom the bounty under the Fenian Raid Volunteer Bounty Act has been paid; the names and addresses of all persons from said counties whose applications have been rejected; and the names and addresses of all applicants from said counties whose applications have not been disposed of. Presented March 3, 1916.—*Mr. Law*.. .. ..*Not printed.*

153. Return to an Order of the House of the 19th February, 1915, for a return showing the names and addresses of all persons in South Cape Breton, Nova Scotia, who have been paid Fenian Raid Bounty; the names and addresses of all persons in South Cape Breton, N.S., who have made application for said bounty and who have not yet received it. Presented March 3, 1916.—*Mr. Carroll*.. .. ..*Not printed.*

CONTENTS OF VOLUME 28—*Continued.*

154. Return to an Order of the House of the 1st March, 1915, for a return showing the names and addresses of all persons who received bounty. Raid Bounty was paid in the county of Halifax, N.S., to date. Presented March 3, 1916.—*Mr. Maclean (Halifax).*
Not printed.

155. Return to an Order of the House of the 31st March, 1915, for a copy of all applications received for Fenian Raid Bounty from residents of the county of Hants, N.S.; also the names of persons who have been paid the bounty and those who have been refused it in said county; with the reasons for refusal, and showing the number of applications that have not yet been dealt with. Presented March 3, 1916.—*Mr. Chisholm (Inverness)*.. .. .. .

CONTENTS OF VOLUME 28—*Continued.*

168. Return to an Order of the House of the 16th February, 1916, for a copy of all letters, petitions, correspondence and telegrams, exchanged between the Government, its resident enginer of the district, and all other persons concerning the construction of a bridge between Ile Perrot and Ste. Ann de Bellevue, and Ile Perrot and Vaudreuil. Presented March 7, 1916.—*Mr. Boyer*.. .. ..*Not printed.*

169. Return to an Order of the House of the 21st February, 1916, for a copy of all letters and correspondence between A. Bellemare, Esq., M.P., and the Government, or any member thereof, in connection with the construction of the post office at Louiseville. Presented March 7, 1916.—*Mr. Gauvreau*.. .. ..*Not printed.*

170. Return to an Order of the House of the 21st February, 1916, for a return showing the amounts spent for the furnishing of the office of the Hon. E. Patenaude, Minister of Inland Revenue; with a copy of all invoices. And also a statement of the amounts spent for the furnishing of the office of the Hon. W. B. Nantel, when Minister of Inland Revenue; with a copy of all invoices. Presented March 7, 1916.—*Mr. Lanctot.*
Not printed.

171. Return to an Order of the House of the 3rd February, 1916, for a copy of all documents, title deeds, papers, notarial deeds or private writings in connection with the sale, donation or transfer, by the estate of Alex. Fraser, of Rivière du Loup, to the Government or the Railway Department, for the Intercolonial, the lot of land or part of the lot of land, at the east of the Intercolonial bridge at Rivière du Loup, at a place called Gauvreau Yard; also of all correspondence in this connection. Presented March 7, 1916.—*Mr. Gauvreau*.. .. ..*Not printed.*

172. Report of the Federal Plan Commission on a general plan for the cities of Ottawa and Hull, 1915. Presented by Sir Robert Borden, March 10, 1916.. .. ..*Not printed.*

173. Return to an Order of the House of the 3rd February, 1916, for copies of all telegrams, letters, petitions, correspondence and other documents whatsoever relating to the post office and the postmaster of the Parish of St. Esprit, in the county of Montcalm, from October, 1911, to the present day. Presented March 10, 1916.—*Mr. Seguin.*
Not printed.

174. Return to an Order of the House of the 16th February, 1916, for a copy of all telegrams, letters, petitions and documents of all kinds, in any way referring to the awarding of the contract for carrying the mail from Inverness to Margaree Harbour. Presented March 10, 1916.—*Mr. Chisholm (Inverness)*.. .. ..*Not printed.*

175. Return to an Order of the House of the 3rd February, 1916, for a copy of all letters, papers, telegrams and documents of all kinds whatsoever in connection with the tenders and awarding of the contract for carrying the mails between the tram cars and the post office at Glace Bay, South Cape Breton. Presented March 10, 1916.—*Mr. Carroll.*
Not printed.

176. Return to an Order of the House of the 7th February, 1916, for a copy of all papers, memoranda, correspondence, reports, etc., in connection with the dismissal of John E. Hallamore, as postmaster at Upper New Cornwall, Lunenburg County, N.S. Presented March 10, 1916.—*Mr. Maclean (Halifax)*.. .. ..*Not printed.*

177. Return to an Order of the House of the 16th February, 1916, for a copy of all telegrams, letters, petitions, and of all documents of all kinds in any way referring to the awarding of the contract for carrying the mail to Eastern Harbour and Pleasant Bay. Presented March 10, 1916.—*Mr. Chisholm (Inverness)*.. .. ..*Not printed.*

178. Return to an Order of the House of the 21st February, 1916, for a detailed statement of all war orders obtained by the Dominion Steel Corporation of Sydney, Nova Scotia. Presented March 10, 1916.—*Mr. Lemieux*.. .. ..*Not printed.*

179. Return to an Order of the House of the 21st February, 1916, for a copy of the war orders given to the Montreal Street Railway Company. Presented March 10, 1916.—*Mr. Fortier*.. .. ..*Not printed.*

180. Report of the International Commission pertaining to the St. John river. Presented by Hon. Mr. Rogers, March 10, 1916.. .. ..*Printed for sessional papers only.*

181. Return to an Order of the House of the 21st February, 1916, for a detailed statement of all the wrecks which have taken place on the St. Lawrence river from 1867 until 1916, inclusive. Presented March 13, 1916.—*Mr. Lemieux*.. .. ..*Not printed.*

182. Return to an Address to His Royal Highness the Governor General of the 3rd February, 1916, for a copy of all Orders in Council, letters, telegrams, reports and other documents regarding the proposed public building in Prince Rupert for post office and other purposes, and regarding the land proposed for such public building and the purchase of such land. Presented March 13, 1916.—*Mr. Knowles*.. .. ..*Not printed.*

CONTENTS OF VOLUME 28—*Continued.*

183. Return to an Address to His Royal Highness the Governor General of the 7th February, 1916, for a copy of the Order in Council or departmental order dismissing Mr. Bayfield from the position of Superintendent of Dredging in British Columbia; and also a copy of the Order in Council or departmental order appointing J. L. Nelson in his place. Presented March 13, 1916.—*Mr. Pugsley*.. .. ..*Not printed.*

184. Return to an Order of the House of the 23rd February, 1916, for a copy of all reports and documents concerning the surveys made by the Federal Government during the autumn of 1914 of Lake Matapedia and the river of the same name down to the village of Amqui. Presented March 13, 1916.—*Mr. Lapointe (Kamouraska)*.. ..*Not printed.*

185. Return to an Order of the House of the 13th March, 1916, for a copy of the pension list in force in Canada for disabled soldiers and of all petitions, letters or other documents relating to the amendment or readjustment of the same. Presented March 14, 1916.—*Printed for distribution and sessional papers.*

186. Return to an Order of the House of the 16th February, 1916, for a copy of all letters, petitions, correspondence and telegrams between the Government, the engineers, and all other persons concerning the building of the post office at Rigaud; also of the amounts of money paid to divers persons for such building, furnishing, the land, the care of the grounds and other works. Presented March 15, 1916.—*Mr. Boyer*.. .. ..*Not printed.*

187. Return to an Order of the House of the 6th March, 1916, for a return showing the different rural mail routes in the constituency of Medicine Hat, with their location and date of establishment; and also all rural mail routes now being established or under consideration at the present time in the same constituency. Presented March 15, 1916. —*Mr. Buchanan*.. .. ..*Not printed.*

187*a*. Return to an Order of the House of the 20th March, 1916, for a return showing:—1. The reason for the delay in the establishment of the rural mail routes, reported under consideration, in the constituency of Medicine Hat. 2. When these routes were first applied for. 3. If the applications possessed the required number of signatures. 4. If tenders have been invited. If so, for what routes. 5. Why the lowest tenders were not accepted, and the routes established. 6. If any tenders are being invited for these routes. 7. If there is a likelihood of any of these routes being operated immediately. Presented March 27, 1916.—*Mr. Buchanan*.. .. ..*Not printed.*

188. Return to an Order of the House of the 21st February, 1916, for a copy of all letters, telegrams, investigations and reports relating to the dismissal of Joseph Fleming, conductor Intercolonial Railway, and in regard to his reinstatement. Presented March 16, 1916.—*Mr. Macdonald*.. .. ..*Not printed.*

189. Return to an Order of the House of the 18th March, 1915, for a copy of all petitions, telegrams, communications and other documents relating to the dismissal of Mr. Hubert Paquin, postmaster of St. Gilbert de Portneuf. Presented March 16, 1916.—*Mr. Delisle. Not printed.*

190. Return to an Order of the House of the 16th February, 1916, for a copy of all letters, petitions, correspondence and telegrams, exchanged between the Government, its Inquiry Commissioner, Mr. G. H. Bergeron, and all other persons, concerning the inquiry, the dismissal and replacing of the postmasters of the different post offices mentioned below; and of all correspondence relating to the appointments of the present postmasters who replace the former ones, who had been either dismissed or replaced for one reason or another:—St. Lazare Village, Vaudreuil Station, Pointe Fortune, Val des Eboulis, Mont Oscar, St. Justine de Newton, Ste. Marthe. Presented March 16, 1916.—*Mr. Boyer. Not printed.*

191. Dismissal of Mr. Chisholm, Inspector of Indian Agencies, Saskatchewan.—(*Senate*). *Not printed.*

192. Return to an Order of the House of the 28th February, 1916, for a return showing:—1. The names, rank and military qualifications of the officers on the Headquarters Staff of the 1st, 2nd and 3rd Divisional Areas, including those on Staffs of Camps and Schools of Instruction, on October 1, 1915. 2. The names of those of the above who on that date had volunteered, taken the oath and been attested for overseas service. Presented March 20, 1916.—*Mr. Proulx*.. .. ..*Not printed.*

193. Return to an Order of the House of the 21st February, 1916, for a return showing:—1. How many persons have been employed by the Department of Militia since the beginning of the war in the examining, appraising or testing of materials, such as clothing, harness, etc., purchased for military purposes. 2. How many of such employees are practical trades people, experts, or otherwise experienced persons in the respective callings connected with the various materials as purchased. Presented March 20, 1916.—*Mr. Verville*.. .. ..*Not printed.*

CONTENTS OF VOLUME 28—*Continued.*

194. Return to an Order of the House of the 6th March, 1916, for a copy of all telegrams, letters, petitions and documents of all kinds referring in any way to the application of Mrs. Flora McIntyre, of River Dennis, Inverness County, N.S., for the Fenian Raid Veteran Bounty of her late husband, Angus McIntyre, late of River Dennis. Presented March 20, 1916.—*Mr. Chisholm (Inverness)*.. .. ..*Not printed.*

195. Return to an Order of the House of the 13th March, 1916, for a return showing:—1. The names, dates of appointment, post office addresses at time of appointment, and former occupations of the censors employed by the Militia Department at Louisburg and North Sydney, Nova Scotia. 2. The names of all the said censors who are also decoders, and the names and addresses of all who are employed in the censorship service at the above points. 3. The amount paid to each censor or decoder since the 4th of August, 1914, up to the 1st February, 1916, or to any party or person in connection with the censorship or decoding services at the above places. Presented March 20, 1916.—*Mr. McKenie.*
Not printed.

196. Return to an Order of the House of the 3rd February, 1916, for a copy of all letters, telegrams, agreements and all other papers relative to the creation of a Board of Conciliation, during the year 1915, under the Industrial Disputes Investigation Act in regard to the employees of the Nova Scotia Steel Company, in the county of Pictou. Presented March 20, 1916.—*Mr. Macdonald*.. .. ..*Not printed.*

197. Return to an Order of the House of the 6th March, 1916, for a list of the employees in the Dominion Police Force, with the salary of each of them. Presented March 20, 1916. —*Mr. Boulay*.. .. ..*Not printed.*

198. Return showing:—1. Whether the Government have taken cognizance of the following article published in the Montreal "Gazette" on November 1, 1915:—"Canadian Help Comes from Sale of Gift Flour. Foodstuffs not Needed by the English Poor were Bought for Belgian Relief.—Funds to Aid East Coast.—Hon. Walter Long Suggested to Canadian Government that $750,000 be Allotted, and Latter Agreed.—(Special cable from the "Gazette's" resident staff correspondent.)

"London, October 31,—'Canada's aid to the east coast towns of England, which are suffering through the war, is the subject of some misconception,' said Sir George Perley to-day. In a statement in the Commons, Hon. Walter Long said that the necessary funds for a Government scheme of help for hotel and lodging house keepers had been generously provided by the Canadian Government. This gave rise to the idea that the Dominion was taking a new step, but the fact is that no money is coming from Canada. Of the flour sent by Canada a year ago to relieve distress in England, very little was distributed, as poverty was in no way abnormal. Some 400,000 bags of this flour were transferred to the American committee for Belgian relief, which purchased them. The money paid for this flour being in the hands of the Local Government Board, Hon. Walter Long, as President of the Board, suggested to Sir George Perley that this might be utilized for the relief of the east coast towns where the season had been ruined owing to the lack of railway facilities and the disinclination of the public to visit the east coast because of the possibility of German naval or aerial raids. The Dominion Government acquiesced in this proposal, and the sum of $750,000, part of the proceeds of the sale of the flour, has now been allotted for this purpose. Canada's generosity will therefore go to alleviate the distress of a large number of better-class people, who are direct sufferers from the war, instead of the destitute poor, for whom it was intended, but who, it develops, were not in need of it." 2. Whether the said article is accurate. If not, in what respect it is inaccurate. Presented March 20, 1916.—*Mr. Papineau.*
Not printed.

198*a*. Return showing:—1. Whether the Government is aware that the following extract from an article was published on the 12th January, 1915, in the Montreal "Gazette":—

"Distress Caused in England by War is Negligible.—Comparatively Small Portion of Colonial Gifts Used for National Relief.—Much Went to Belgians.—War Office also took Large Share.—Salvation Army has Scheme Requiring Canadian Co-operation.—(Special cable from the "Gazette's" resident staff correspondent.)

"London, January 11.—Very satisfactory evidence of the comparative absence in England of any distress caused by the war is furnished by a report on the special work of the Local Government Board arising out of the war, which was issued to-day as a White Paper. The action by Noel Kershaw, dealing with the disposition of the gifts from the Colonies, shows that only a small part of the goods allocated has been required for relieving the distress of civilians.

"The following is the disposition of the 940,530 bags of flour received from Canada: To the local committees for the relief of distress, 90,474; to the Belgian Refugees Committees, 1,691; transferred to the War Office, 99,760; further offer to the War Office, 300,000; to the Belgian Relief Commission, 443,886; sold, owing to damage, 4,719." 2. Who had charge of accepting delivery and the shipping of this flour. 3. Whether the Government have any information of the shortage of 59,430 bags of flour, alleged in said article. If not, what became of the flour that was short. Presented March 20, 1916.—*Mr. Papineau*.. .. ..*Not printed.*

CONTENTS OF VOLUME 28—*Continued.*

199. Return to an Order of the House of the 6th March, 1916, for a return showing the amounts contributed from the constituency of Medicine Hat for machine guns, and by whom contributed or forwarded. Presented March 21, 1916.—*Mr. Buchanon*.. ..*Not printed.*

200. Return to an Order of the House of the 13th March, 1916, for a copy of all letters, petitions, recommendations and other documents in the possession of the Post Office Department relating to the appointment of the postmaster at West Roachdale, Guysborough County, Nova Scotia, to take the place of J. H. McGuire, deceased. Presented March 21, 1916.—*Mr. Sinclair*.. .. ..*Not printed.*

201. Return to an Order of the House of the 28th February, 1916, for a return showing in detail the payment or payments amounting to $647.50, paid to P. A. Stoddart, fishery guardian, Shelburne County, N.S., during the year ending March 31, 1915. Presented March 21, 1916.—*Mr. Kyte*.. .. ..*Not printed.*

202. Return to an Order of the House of the 28th February, 1916, for a copy of all correspondence, letters, telegrams and documents of all kinds relating to the chartering of the vessel *Starling*, by the Department of Marine and Fisheries. Presented March 21, 1916. *Mr. Kyte*.. .. ..*Not printed.*

203. Return to an Order of the House of the 7th February, 1916, for a copy of all documents, letters, messages, correspondence and reports concerning a conference between the Minister of Agriculture and certain representatives of the Mennonite Church in or about July, 1873, and referred to in a certain letter dated 23rd July, 1873, signed by P. M. Lowe, Secretary of the Department of Agriculture, and addressed to Messrs. David Klassen, Jacob Peters, Heinrich Wiebe and Cornelius Toews, delegates from Southern Russia. Presented March 21, 1916.—*Mr. McCroney*.. .. ..*Not printed.*

204. Return to an Order of the House of the 13th March, 1916, for a copy of all letters, telegrams, petitions, memorials and other documents relating to the subsidizing by the Government of the construction of ships in British Columbia, or of ships when built; or as to the laying down or constructing or assisting in the construction in British Columbia of twenty-five ships by the Government, or as to assisting by subsidies or otherwise in the construction of ships in the Dominion. Presented March 23, 1916.—*Mr. Macdonald.* *Not printed.*

205. Return to an Order of the House of the 13th March, 1916, for a copy of the affidavit of David W. McLean, Windsor, N.S., to whom Warrant No. 25737 was issued for Fenian Raid Bounty, and also a copy of all correspondence and other documents relating to the payment of the same. Presented March 23, 1916.—*Mr. Macdonald*.. .. .. ..*Not printed.*

206. Return to an Order of the House of the 9th March, 1916, for a return showing:—1. The amount collected in wharfage on goods landed on Government wharves in the county of Victoria, at Neils Harbour, Ingonish, Englishtown, South Gut, Baddeck, Little Narrows, Nyaiga, and Big Bras d'Or. 2. The amount collected at each of the above places, by whom collected, and how much returned to the Government in each case. Presented March 27, 1916.—*Mr. McKenzie*.. .. ..*Not printed.*

207. Return to an Order of the House of the 20th March, 1916, for a return showing:—The names of the 54 Canadian officers employed in the Canadian Pay and Record Office, London, and amounts per month paid to each of them. Presented March 27, 1916.—*Mr. Macdonald*.. .. ..*Not printed.*

208. Return to an Order of the House of the 3rd February, 1916, for a copy of all letters, telegrams, petitions, directions and other documents relative to the surveys for a railway under the Railway Department, which have been carried on during the past summer, at points east and west from Sunnybrae, in the county of Pictou. Presented March 27, 1916.—*Mr. Macdonald*.. .. ..*Not printed.*

209. Return to an Order of the House of the 21st February, 1916, for a copy of all papers, agreements, letters, telegrams and other documents relating to the proposal to purchase, lease, or use of, the railway known as the Vale Railway, county of Pictou, and to the operation of the same by the Railway Department. Presented March 27, 1916.—*Mr. Macdonald*.. .. ..*Not printed.*

210. Return to an Order of the House of the 7th February, 1916, for a return showing the number and purpose of all commissions appointed by the Government since 1911, and the cost of each, together with names of the various members of such commissions. Presented March 27, 1916.—*Mr. Pardee*.. .. ..*Not printed.*

211. Return to an Order of the House of the 6th March, 1916, for a copy of all correspondence, letters, telegrams and documents relating to the dismissal or resignation of Dr. W. T. Patton from the service of the Veterinary Inspection Branch of the Department of the Interior, and his re-appointment and his later dismissal or resignation. Presented March 27, 1916.—*Mr. Buchanan*.. .. ..*Not printed.*

CONTENTS OF VOLUME 28—*Continued.*

211a. Return to an Order of the House of the 3rd April, 1916, for a copy of all correspondence, letters, telegrams and documents relating to the dismissal or resignation of Dr. W. T. Patton, from the service of the Veterinary Inspection Branch of the Department of Agriculture at Coutts, Alberta, and his re-appointment and later dismissal or resignation. Presented May 10, 1916.—*Mr. Buchanan*.. .. ..*Not printed.*

212. Return to an Order of the House of the 28th February, 1916, for a copy of all accounts, telegrams, letters, bills of costs and other documents relating to the case of J. P. Dionne against the King, before the Exchequer Court, in which case Mr. Leo Bérube was attorney and Mr. E. H. Cimon was counsel, both being lawyers of Fraserville. Presented March 27, 1916.—*Mr. Gauvreau*.. .. ..*Not printed*

212a. Return to an Order of the House of the 5th April, 1916, for a copy of all telegrams and letters from Leo Berube, lawyer, M.P.P., to the Minister of Justice, relating to the production of the official and public documents asked for by C. A. Gauvreau, M.P., in the case of J. P. Dionne vs. The King, and of any answers of the Minister of Justice to such telegrams and letters. Presented April 10, 1916.—*Mr. Gauvreau*.. .. ..*Not printed.*

213. Return to an Address to His Royal Highness the Governor General, of the 7th February, 1916, for a copy of all correspondence with the Imperial authorities in connection with the purchase of horses, and the prohibiting of the export of horses. Presented March 27, 1916.—*Sir Wilfrid Laurier*.. .. ..*Not printed.*

214. Return to an Order of the House of the 1st March, 1916, for a copy of all correspondence, telegrams, reports and documents of all kinds relating to the visits of a fair wage officer to New Glasgow, N.S., in connection with the schedule of wages of men employed in works making shells at that place. Presented March 28, 1916.—*Mr. Macdonald.*
Not printed.

215. Copy of Order in Council P.C. No. 634, dated 24th March, 1916, *re* the prohibition of the exportation of certain goods including nickel, nickel ore and nickel matte, to certain foreign ports. Presented by Sir Robert Borden, March 28, 1916.
Printed for sessional papers only.

216. Return to an Order of the House of the 6th March, 1916, for a copy of all correspondence, accounts, vouchers, memoranda, etc., relating to the construction of a launch way and boat house at Bear Cove Beach, Halifax County, N.S., and completed in 1914. Presented March 29, 1916.—*Mr. Maclean (Halifax)*.. .. ..*Not printed.*

217. Return to an Order of the House of the 6th March, 1916, for a detailed statement of the expenditure last year at McNair's Cove, Nova Scotia, giving the names of the workmen, the number thus employed, the amount paid to each; also the amount paid for supplies and material, and the names of the persons to whom the same was paid. Presented March 29, 1916.—*Mr. Chisholm (Antigonish)*.. .. ..*Not printed.*

218. Return to an Order of the House of the 6th March, 1916, for a copy of all correspondence, accounts, vouchers, receipts, etc., in connection with the construction of a wharf at Shad Bay, Halifax County, N.S., in 1914 and 1915. Presented March 29, 1916.—*Mr. Maclean (Halifax)*.. .. ..*Not printed.*

219. Return to an Order of the House of the 16th March, 1916, for a return showing:—1. Whether the Government has received any complaints as to the manner of supplying clothing to the Royal Military College, or as to its fit, workmanship or materials employed, or as to any delay in furnishing the cadets with clothing. 2. If so, from whom such complaints have been received. 3. On what grounds. 4. What form the complaint was in. 5. The nature of the complaint. 6. If the Government is aware as to whether or not there has been dissatisfaction as to the fit, workmanship and materials employed, or as to any delay in furnishing the cadets with clothing. 7. If it is true, as alleged, that the late Commandant of the Royal Military College, Colonel Crowe, before he left, recommended a change of system for the supply of clothing, and outlined the features of such a system. 8. If so, the details of the plan suggested. 9. To what extent the plan suggested by Colonel Crowe was adopted. If not adopted, why not. 10. Whether the present Commandant of the Royal Military College made any suggestions as to a change in the system of supplying clothing to the cadets. 11. If so, the changes which he suggested. Presented March 30, 1916.—*Mr. Carvell.*
Not printed.

220. Escape of alien enemies from detention camps at Amherst, N.S.—(*Senate*)..*Not printed.*

221. Return to an Order of the House of the 21st February, 1916, for a copy of all letters, petitions, papers, telegrams, tenders and other documents relating to the establishment of a rural mail route from Alma, through Sylvester and Loch Broom, and as to the closing of the post offices at Sylvester and Loch Broom. Presented March 31, 1916.—*Mr. Macdonald*.. .. ..*Not printed.*

CONTENTS OF VOLUME 28—*Continued.*

222. Return to an Order of the House of the 3rd February, 1916, for a copy of all petitions, letters, papers, telegrams, tenders and other documents relating to the establishment of rural mail route from Scotsburn to North Scotsburn, Rogers Hill and Hardwood Hill, and as to the closing of any post offices on said route. Presented March 31, 1916.—*Mr. Macdonald*.. .. .. .

CONTENTS OF VOLUME 28—*Continued.*

232. Return to an Order of the House of the 15th March, 1916, for a copy of all letters, telegrams and petitions in the possession or under the control of the Post Office Department having reference to the dismissal of Postmaster McRitchie at North River Centre, Victoria County, Nova Scotia, and to the appointment of Neil McLeod in his place. Presented April 5, 1914.—*Mr. McKenzie*.. .. ..*Not printed.*

233. Return to an Order of the House of the 27th March, 1916, for a copy of all petitions, correspondence, telegrams, recommendations and other papers or documents in the possession of the Postmaster General or his department, relating to the dismissal of James Hall, Postmaster at Milford Haven Bridge, Guysborough County, Nova Scotia, and the appointment of Guy O'Connor, as his successor. Presented April 5, 1916.—*Mr. Sinclair*. *Not printed.*

234. Return to an Order of the House of the 7th February, 1916, for a report showing the apportioning of electoral polling divisions in Manitoba, made by judges under authority of the Dominion Elections Act, 7-8 Edward VII, Chapter 26. Presented April 5, 1916.—*Sir Wilfrid Laurier*.. .. ..*Not printed.*

235. Return to an Order of the House of the 23rd February, 1916, for a copy of all profiles, reports, correspondence and all documents concerning the construction of a viaduct at Amqui, on the Intercolonial Railway, at the place called Traverse Dubé, Dubé Crossing; also of the plans of properties belonging to the Intercolonial Railway at Amqui, and of the land leased to the Municipality of Amqui, with a copy of the lease affecting such land. Presented April 5, 1916.—*Mr. Lapointe (Kamouraska)*.. .. ..*Not printed.*

236. Return to an Order of the House of the 20th March, 1916, for a return showing the number of horses bought for remounts in Alberta, the persons from whom they were purchased, and the amount paid for each horse. Presented April 6, 1916.—*Mr. Buchanan*. *Not printed.*

237. Return to an Order of the House of the 15th March, 1916, for a return showing:—1. Who has been furnishing food, clothing and other necessary supplies to the soldiers at North Sydney and Sydney Mines, since the 4th August, 1914, to the 1st February, 1916. 2. The names and amounts paid to each, and amounts due to each on 1st February, 1916, over and above what has already been paid. 3. Whether the said supplies of all kinds were obtained or called for by public tender. If so, how the tenders were called, and who the tenderers were. 4. If the contracts for such supplies were always given to the lowest tenderer. 5. The names of those who tendered, and the figures of the tenders in each case. 6. The different methods by which tenders were invited, and for what classes of merchandise or supplies. Presented April 6, 1916.—*Mr. McKenzie*.. ..*Not printed.*

238. Order in Council No. P.C. 680, dated 23rd March, 1916, respecting the application of the Industrial Disputes Investigation Act, 1907, in the case of disputes between employers and employees affecting the delivery of war supplies. Presented by Hon. Mr. Roche, April 6, 1916.. .. ..*Not printed.*

239. Return to an Order of the House of the 13th March, 1916, for a copy of all the evidence taken by the Commission appointed to inquire into claims for damages made against the Militia Department in the town of Sydney Mines, Nova Scotia, and of the report made upon each claim or case, said claims being for damages to lands and other property. Presented April 7, 1916.—*Mr. McKenzie*.. .. ..*Not printed.*

240 Return to an Order of the House of the 1st March, 1916, for a copy of all letters, correspondence and telegrams between the Speaker, the Clerk of the House of Commons, the Civil Service Commission and the Minister of Finance in regard to the proposed appointment of Mr. H. Crossley Sherwood, as Assistant Clerk of Routine and Records, from 1st October, 1914, down to the present date. Presented April 7, 1916.—*Mr. Turriff*. *Not printed.*

240a. Supplementary Return to an Order of the House of the 1st March, 1916, for a copy of all letters, correspondence and telegrams between the Speaker, the Clerk of the House of Commons, the Civil Service Commission and the Minister of Finance in regard to the proposed appointment of Mr. H. Crossley Sherwood, as Assistant Clerk of Routine and Records, from 1st October, 1914, down to the present date. Presented April 10, 1916.—*Mr. Turriff*.. .. ..*Not printed.*

241. Return to an Order of the House of the 20th March, 1916, for a copy of all recommendations, letters, telegrams and correspondence relating to the recent appointment of a lightkeeper at Arisaig, N.S. Presented April 7, 1916.—*Mr. Chisholm (Antigonish)*. *Not printed.*

242. Return to an Order of the Senate dated 31st March, 1916:—For a copy of all papers, letters and all correspondence regarding the passport granted to W. F. Bauman, an alien enemy. The said Bauman is a Bavarian.—(*Senate*).. .. ..*Not printed.*

CONTENTS OF VOLUME 28—*Continued.*

243. Return to an Order of the House of the 3rd February, 1916, for a copy of all letters, telegrams, or other communications sent to the Government or any member or department thereof before 15th August, 1914, pointing out the necessity of granting relief to the settlers in the drouth-stricken area of Alberta. Presented April 10, 1916.—*Mr. Buchanan*.. .. .. .

CONTENTS OF VOLUME 28—*Continued.*

254. Return to an Order of the House of the 21st February, 1916, for a copy of all letters, papers, telegrams and other documents relating to the survey in the harbour of Pictou, for a proposed new bridge, by the Railway Department; and also a statement showing the amounts paid in connection with said survey, the names of the persons to whom paid, and the purposes for which they were paid. Presented April 11, 1916.—*Mr. Macdonald*.. .. .. .

CONTENTS OF VOLUME 28—*Continued.*

265. Return to an Order of the House of the 12th April, 1916, for a return showing:—1. How many clerks there are in the Finance Department who belong to and are paid from the outside service vote and who work in the inside service. 2. The names of said clerks. 3. Salary paid to each. 4. How long each has been in the service of the Department. 5. If all or any of these clerks have passed any examination. If so, what examination and on what date or dates. Presented April 26, 1916.—*Mr. Turriff*.. .. .. ..*Not printed.*

266. Return to an Order of the House of the 23rd February, 1916, for a return showing:—1. The number of permanent employees in the Department of Inland Revenue in 1915-16. 2. How many there will be in 1916-17. 3. How much money was paid in salaries for temporary employees in each of the following years: 1912-13, 1913-14, 1914-15 and 1915-16. 4. The names of the temporary employees and the dates of their appointment, respectively. Presented April 26, 1916.—*Mr. Lanctot*.. .. ..*Not printed.*

267. Return to an Order of the Senate dated the 14th instant, showing the number of men recruited up to the first day of April, 1916.—(*Senate*).. .. ..*Not printed.*

268. Return to an Order of the Senate, dated the 23rd day of March, 1916, of all papers and documents dealing with the escapes and the liberation of alien enemy prisoners from the detention camp situated at Banff, in the province of Alberta. Ordered, That the same do lie on the table.—(*Senate*).. .. ..*Not printed.*

269. Return to an Order of the House of the 19th April, 1916, for a return showing:—1 Whether there is a Director of Recruiting and Organizations in England for the Canadian Service. 2. If so, his name and duties. 3. The number employed upon his staff. 4. The total expenses of his staff. Presented April 28, 1916... .. ..*Not printed.*

270. Return to an Order of the Senate, dated 11th instant:—For a copy of an application made by Rev. Isaac Hunter Macdonald, of Kintore, Ontario, to the Militia Department for a position of chaplain or major; also, of all copies of letters, papers or telegrams either recommending or opposing said application.—(*Senate*).. .. ..*Not printed.*

271. Return to an Address to His Royal Highness the Governor General of the 29th March, 1916, for a copy of all petitions received by the Governor General in Council requesting the disavowal of the Act of the Legislature of the Province of Ontario, Chapter 46, 5 George V, 1915, concerning the School Commission of the Roman Catholic Schools of the City of Ottawa, and of all documents, memoranda, reports, letters and correspondence concerning the said petitions for disavowal, or concerning the said Act of the Legislature of the Province of Ontario, 5 George V, Chapter 45. Presented May 1, 1916.—*Mr. Lapointe (Kamouraska)*.. .. ..*Not printed.*

271*a*. Order in Council and Report of Minister of Justice transmitting to Lieutenant Governor of Ontario copy of petition from Samuel Genest and others, praying for the disallowance of an Act of the Legislature of Ontario, Chapter 45 of 5 George V (1915). Order in Council and Report of Minister of Justice on the Statutes of the Legislature of Ontario, passed in the 5th year of His Majesty's reign (1915). Report of Prime Minister of Ontario on petition relating to the disallowance of an Act of the Legislature of Ontario, Chapter 45 of 5 George V (1915). Presented May 3, 1916.—*Mr. Lapointe (Kamouraska)*.. .. ..*Printed for sessional papers only.*

272. Return to an Order of the House of the 20th March, 1916, for a copy of all telegrams, letters, correspondence and contracts between the Quebec Harbour Commission and Benjamin Demers, of the parish of St. Nicolas, county of Lévis, concerning the purchase of the St. Nicolas quarry. Presented May 1, 1916.—*Mr. Bourassa*.. .. ..*Not printed.*

273. Return to an Order of the House of the 13th March, 1916, for a return showing a list of vessels belonging to the Canadian Government which are on service under the provision of the Canadian Naval Act, and of all vessels not now in service and their present condition and suitability for service, and also for a copy of all letters, petitions or communications had by or with the Government in regard to the establishment of a Canadian Naval Brigade. Presented May 1, 1916.—*Mr. Macdonald*.. .. .. ..*Not printed.*

274. Return to an Order of the House of the 29th March, 1916, for a copy of all correspondence, petitions and papers, including the report of Charles Bruce, engineer, in the possession of the Department of Marine and Fisheries relating to the construction of a bait freezer at White Head, Nova Scotia. Presented May 1, 1916.—*Mr. Sinclair*

Not printed.

275. Duplicate Return to an Order of the House of the 17th March, 1915, for a copy of all correspondence and reports relating to the purchase of 25,000 shovels of special pattern, mentioned in Order in Council P.C. 2302, dated 4th September, 1914, on page 38 of memoranda respecting work of the Department of Militia and Defence, and also relating to any further purchases of such shovels. Presented May 1, 1916.—*Mr. Hughes (P.E.I.)*.. .. ..*Not printed.*

CONTENTS OF VOLUME 28—*Continued.*

276. Return to an Order of the House of the 5th April, 1916, for a copy of all letters, telegrams, offers, tenders, reports, contracts and documents relating to the sale or other disposal of small arms ammunition since 4th August, 1914. Presented May 1, 1916.—*Mr. Macdonald*.. .. .. .

CONTENTS OF VOLUME 28—*Continued.*

284. Return to an Order of the House of the 27th March, 1916, for a return showing the names and addresses of all persons in the Public Service of any and every Department of the Government of Canada, in the counties of Cape Breton, Victoria, Inverness, Richmond, Guysborough, Antigonish and Pictou, Province of Nova Scotia. Presented May 4, 1916. —*Mr. Carroll*.. .. .. .

CONTENTS OF VOLUME 28—*Concluded.*

295a. Correspondence in respect to the offer of sale to the Government of Canada of the Quebec, Montmorency and Charlevoix Railway, the Quebec and Saguenay Railway and the Lotbinière and Megantic Railway. Presented by Hon. Mr. Reid, May 16, 1916.
Not printed.

296. Return to an Address to His Royal Highness the Governor General of the 1st March, 1916, for a copy of all correspondence, letters, telegrams, Orders in Council, etc., relating to the transfer by the Government of Ontario to the Government of Canada, of the rights held by the former in the lakes, dams, etc., contiguous to or forming a part of the Trent Valley Waterways System. Presented May 17, 1916.—*Mr. Graham.*
Not printed.

297. Return to an Order of the House of the 1st May, 1916, for a copy of all papers, telegrams, letters and other documents in connection with the decision to locate an interior storage elevator at Calgary, Alberta. Presented May 17, 1916.. .. ..*Not printed.*

298. Return to an Order of the House of the 12th April, 1916, for a return showing the plan and description of the proposed permanent harbour quay line in the harbour at Pictou, and for a copy of all papers, letters, telegrams and other documents relating to the establishment of the same. Presented May 17, 1916.—*Mr. Macdonald .. ..Not printed.*

299. Return to an Order of the House of the 21st February, 1916, for a copy of all tenders, offers, letters, telegrams and other documents relating to the arrangements for the handling of freight and coal at Pictou, in connection with the boats engaged in the winter service between Pictou and Prince Edward Island during the year 1914-1915, and during the present season. Presented May 18, 1916.—*Mr. Macdonald .. .. ..Not printed.*

ANNUAL REPORT

OF THE

DEPARTMENT OF THE INTERIOR

FOR THE

Fiscal Year ending March 31, 1915

PRINTED BY ORDER OF PARLIAMENT

OTTAWA
PRINTED BY J. DE L. TACHÉ, PRINTER TO THE KING'S MOST EXCELLENT MAJESTY.
1915

[No. 25—1916]

To Field Marshall His Royal Highness Prince Arthur William Patrick Albert, Duke of Connaught and Strathearn, K.G., K.T., K.P., etc., etc., etc., Governor General and Commander in Chief of the Dominion of Canada.

May it Please Your Royal Highness:

The undersigned has the honour to lay before Your Royal Highness the report of the transactions of the Department of the Interior for the fiscal year ending March 31, 1915.

Respectfully submitted,

W. J. ROCHE,
Minister of the Interior.

Ottawa, October 1, 1915.

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REPORT

OF THE

DEPARTMENT OF THE INTERIOR.

1914-15.

DEPARTMENT OF THE INTERIOR,
OTTAWA, June 1, 1915.

Honourable W. J. ROCHE,
Minister of the Interior,
Ottawa.

I have the honour to submit the forty-second Annual Report of the Department of the Interior for the twelve months ending the 31st of March, 1915.

Although conditions have suffered a serious set back during the present year, the outlook at the present time is much brighter than was anticipated at the outset. The financial situation is in much better condition now than it has been during the last ten months, and the hopes for the future are much brighter.

The revenue of the department has fallen off to some extent, but it is pleasing to note that in one branch there has been quite a substantial increase. The increase in the revenue from petroleum over that of last year is over three-quarters of a million dollars, while in other branches, a small increase is also shown.

Immigration has fallen off to a very great extent, but under the existing conditions, this might well be expected. Indications are to the effect that after the present crisis is past, we may anticipate a very material increase in the immigration.

The work of the department in the various branches as shown from the individual reports has been conducted in a highly satisfactory manner.

The financial depression in the west and the misfortunes experienced by a large number of settlers on account of drought, was the cause of many hardships to settlers in the western provinces, but every effort was made by this department to meet the requirements of these cases, and it is gratifying to know that in localities most affected last year the present reports indicate abnormally large crops and it is hoped that this will in a great measure alleviate the sufferings endured by the settlers in the localities affected.

DEATHS.

Head Office—

E. Boselly, Water Power Branch, died 20th April, 1914.
Miss J. D. Dewar, Registration Branch, died 27th May, 1914.
H. W. Wilson, Geographer's Branch, died 15th June, 1914.

F. Fitz-Roy Dixon, Assistant Deputy Commissioner of Dominion Lands, died 18th August, 1914.

Miss I. M. Grant, Dominion Lands Branch, died 5th November, 1914.

Outside Service—

Wm. McLellan, Timber Cruiser, Grouard, Alberta, died 17 May, 1914.

Wm. Mawhinney, Inspector of School Lands, Portage la Prairie, Manitoba, killed by a train, 1st October, 1914.

D. C. Macdonald, Dominion Parks Office, Banff, Alberta, died 4th October, 1914.

Frand F. Tims, Clerk, Dominion Lands Office, Edmonton, Alberta, died 31st October, 1914.

J. J. Barnet, Forest Ranger, Duck Lake, Saskatchewan, died 18th October, 1914.

A. E. Keast, Sub Agent of Dominion Lands, Innisfail, Alberta, died 23rd January, 1915.

STATEMENT showing Gross Cash Revenue received from all sources during the fiscal year ended March 31, 1915, compared with the receipts for the previous fiscal year.

Source of Revenue.	Fiscal Year 1914-1915.	Fiscal Year 1913-1914.	Increase.	Decrease.	Net Decrease.
	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
Dominion Lands	3,177,386 73	3,313,259 65		135,872 92	
School Lands	943,717 00	1,215,822 37		272,105 37	
Ordnance Lands	4,416 64	5,805 98		1,389 34	
Seed Grain	68,263 56	176,736 89		108,473 33	
Casual Revenue	11,738 10	27,884 47		16,146 37	
Registration Fees, Yukon	969 85	966 50	3 35		
Fines and Forfeitures, N.W.T.	62 00	20 00	42 00		
Fines under Immigration Act	5,766 00	7,868 50		2,102 50	
Chinese Immigration Revenue	588,124 00	2,644,593 00		2,056,469 00	
Sales of Land, Special Act	539,711 15	396,969 33	142,741 82		
	5,340,155 03	7,789,926 69	142,787 17	2,592,558 83	2,449,771 66

SESSIONAL PAPER No. 25

STATEMENT of Receipt on account of Dominion Lands Revenue for the fiscal year ended March 31, 1915, as compared with the Receipts for the previous year.

Particulars.	1914-15.	1913-14.	Increase.	Decrease.	Net Decrease.
	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
Homestead fees	238,295 00	317,412 00		79,117 00	
Pre-emption fees	28,720 00	61,660 00		32,940 00	
Purchased homestead fees	4,150 00	7,840 00		3,690 00	
Improvements	114,982 17	187,052 46		72,070 29	
Pre-emption sales under Act 1908	387,642 22	655,430 87		267,788 65	
Purchased homestead sales	170,126 14	397,652 77		227,526 63	
*General sales	133,354 20	226,139 87		92,785 67	
Map sales, Office fees, etc	14,290 23	16,056 07		1,765 84	
Rentals of land	8,249 47	8,735 98		486 51	
Survey fees	9,607 92	25,138 39		15,530 47	
Timber dues	310,934 29	378,365 33		67,431 04	
Grazing lands	101,710 58	84,926 15	16,784 43		
Coal lands	247,466 59	362,228 99		114,762 40	
Hay permits	9,065 62	8,512 23	553 39		
Mining fees	77,343 12	74,710 20	2,632 92		
Hydraulic leases	5,286 98	2,490 65	2,796 33		
Dredging leases	5,597 49	1,226 26	4,371 23		
Export tax on gold	116,241 04	132,537 69		16,296 65	
Free certificates for export of gold	107 00	121 00		14 00	
Stone quarries	12,098 40	13,405 79		1,307 39	
Irrigation fees	679 50	744 00		64 50	
Rent of water power	953 98	771 64	182 34		
Irrigation sales	5,549 67	24,364 03		18,814 36	
Fees *re* Board of Examiners, D.L.S	970 60	1,350 00		379 40	
Patent and Interchange fees	626 10	562 00	64 10		
Suspense Account	7,663 62	5,408 72	2,254 90		
Interim receipt account—Yukon	1,015 37	261 30	754 07		
Sand, stone and gravel	2,517 58	5,858 69		3,341 11	
Petroleum	1,116,181 89	261,178 13	855,003 76		
Rocky Mountain Park	35,380 21	45,156 35		9,776 14	
Jasper Park	1,221 65	2,711 17		1,489 52	
Yoho Park	656 25	717 91		61 66	
Waterton Lakes Park	257 46	154 50	102 96		
Buffalo Park	22 69		22 69		
Elk Island Park	5 00	60 40		55 40	
Forestry Branch, trees, etc	1,366 23	1,713 85		347 62	
Miscellaneous	6,697 76	604 26	6,093 50		
Glacier Park	345 71		345 71		
Revelstoke Park	7 00		7 00		
	3,177,386 73	3,313,259 65	891,969 33	1,027,842 25	135,872 92
Refunds	317,672 14	277,299 33	40,442 81		
	2,859,714 59	3,036,030 32	851,526 52	1,027,842 25	176,315 73

* In addition to $133,354.20, on account of General Sales, the Department received $539,711.15 from sales of Railway Lands, which sum, as provided for by Orders in Council, has been credited to Special Accounts in the books of the Finance Department.

STATEMENT showing Receipts on Account of Dominion Lands from July 1, 1872, to March 31, 1915.

Fiscal Year.	Homesteads Fees.	Pre-emption Fees.	Improvements.	Sales.		Map Sales, Office and Registration Fees, etc.	Dominion Lands Surveyors Examination Fees.	Rents Survey Fees, Miscellaneous, including Trust Account.	Purchased, Homestead, Inspection, Cancellation and Sundry Fees.	Timber Dues.
				Cash.	Scrip.					
	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
1872-73	6,960 00			19,170 20						109 25
1873-74	7,310 00			19,834 75				125 50		2,710 55
1874-75	11,510 00			13,666 90		129 00				2,335 25
1875-76	4,680 00			3,478 94	320 00					387 00
1876-77	2,250 00			1,085 86	136,955 16	4 60		100 00	40 00	320 00
1877-78	14,540 00			2,794 86	120,159 54		180 00		290 00	1,620 00
1878-79	17,690 00			4,998 39	210,904 84	81 00	310 00	13 70	410 00	325 00
1879-80	41,255 00	10,241 45		45,708 97	81,685 86	245 40	580 00	183 25	1,780 00	25,121 46
1880-81	20,450 00	10,801 75	269 00	71,170 17	70,828 30	985 40	420 00	37 58		32,028 34
1881-82	54,155 00	39,843 90	1,758 00	1,240,328 27	50,590 84	3,036 45	890 00	58 10		58,753 14
1882-83	73,015 00	54,725 00	7,114 91	516,092 21	33,638 40	3,109 50	890 00	501 77	45	90,066 46
1883-84	41,580 00	28,810 00	2,596 11	424,863 36	40,919 67	1,289 55	530 00	45,766 53	1,713 00	137,983 10
1884-85	25,615 00	17,100 00	2,328 75	199,275 32	45,875 60	1,621 82	370 00	50,068 57	2,685 00	87,474 99
1885-86	26,110 00	14,371 00	1,101 50	76,110 41	214,657 97	1,339 34	360 00	20,070 00	5,025 40	64,820 31
1886-87	19,614 00	6,887 93	1,971 55	48,175 76	337,640 19	1,171 39	240 00	44,561 00	7,778 53	65,111 74
1887-88	23,691 00	4,830 00	1,918 35	52,238 36	313,522 67	1,660 75	240 00	20,591 41	12,078 50	94,964 55
1888-89	39,460 00	10,550 00	4,128 48	57,513 16	318,238 57	1,410 16	220 00	10,389 57	20,402 50	90,290 00
1889-90	35,920 00	8,580 00	3,250 54	54,896 85	228,744 47	2,099 07	190 00	3,316 23	20,232 50	84,642 95
1890-91	29,164 10		6,302 61	91,664 98	171,425 14	1,854 78	88 00	7,951 05	14,712 50	102,902 71
1891-92	46,994 00		6,472 31	108,901 01	97,822 41	2,147 31	135 00	29,898 49	23,104 09	106,461 35
1892-93	37,689 74		7,113 50	93,671 67	77,231 18	975 20	82 00	18,509 35	22,011 00	105,865 24
1893-94	36,462 26		3,497 76	53,254 71	27,840 96	973 11	40 00	13,457 09	11,097 90	81,290 51
1894-95	29,664 88		3,567 90	37,293 71	23,269 62	695 99		6,271 77	6,566 50	74,079 20
1895-96	18,278 00		3,163 15	46,373 98	46,929 65	610 78	50 00	21,679 31	6,810 50	61,923 47
1896-97	21,179 00		3,737 01	49,335 53	16,929 38	795 05	70 00	19,421 98	8,527 00	68,992 82
1897-98	34,780 00		5,619 63	80,178 64	28,918 14	1,987 40	10 00	21,242 66	10,042 50	119,313 78
1898-99	58,235 00		4,297 62	116,598 35	21,307 58	1,262 05	20 00	75,085 95	13,549 00	155,360 63
1899-1900	72,690 00		4,835 81	103,247 58	88,756 22	1,258 85	190 00	38,072 54	14,937 00	126,315 82
1900-1901	79,910 00		5,213 32	40,360 93	326,270 03	3,874 14	165 00	70,970 54	12,722 00	209,399 32
1901-1902	144,125 00		8,481 46	66,950 21	169,767 13	5,792 96	370 00	71,997 30	663 00	207,790 90
1902-1903	320,409 65		11,829 08	155,507 59	158,452 66	5,911 96	365 00	125,158 56	595 00	470,916 93
1903-1904	255,772 36		15,119 47	196,750 15	188,424 22	5,549 13	463 50	81,550 46	1,081 00	397,314 33
1904-1905	304,806 25		21,571 25	154,128 04	19,644 59	4,879 13	906 50	144,924 31	1,205 00	266,951 46
1905-1906	417,834 25		31,795 19	442,588 69	7,654 57	6,042 34	474 00	141,948 55	976 25	292,684 53
1906-1907 nine months	215,449 55		39,763 63	494,117 12	11,349 89	5,449 06	420 00	69,536 31	1,089 51	379,476 32
1907-1908	301,693 73		71,139 47	656,303 03	92,311 24	7,727 29	690 00	148,914 00	1,283 50	473,608 94

1908–1909	389,039 00	141,550 15	70,928 86	951,442 28	20,136 27	296 55	1,040 00	75,596 36	9,946 50	269,837 52
1909–1910	415,232 00	174,250 00	105,009 07	1,239,037 33	9,973 84	9,145 49	1,577 10	100,257 89	14,028 30	378,010 70
1910–1911	445,135 00	156,486 00	143,227 13	1,193,756 04	1,437 84	8,730 01	1,310 00	42,111 92	20,142 85	387,054 96
1911–1912	391,703 12	102,070 00	184,325 92	1,967,182 85	3,256 99	11,239 14	1,400 00	44,167 03	14,745 50	466,668 61
1912–1913	337,055 00	85,940 00	168,904 42	1,650,491 87	6,157 27	14,483 91	1,040 00	17,866 65	11,380 00	463,738 75
1914–1915	238,295 00	28,720 00	114,982 17	691,122 56	80 00	14,290 23	970 60	32,218 77	4,776 10	310,934 29
Total	5,425,143 89	957,416 16	1,254,917 29	14,810,915 10	3,829,268 90	157,200 76	18,646 70	1,654,741 30	306,833 29	7,138,382 51

STATEMENT showing Receipts on Account of Dominion Lands from July 1, 1872 to March 31, 1915.—*Concluded.*

Fiscal Year.	Grazing Lands.		Hay, Coal, Mining, Stone Quarries Export Tax on Gold, etc.		Canadian national Park.	Colonization Lands.		Gross Revenue.	Refunds.	Net Revenue.
	Cash.	Scrip, etc.	Cash.	Scrip.		Cash.	Scrip.			
	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
1872-73								26,239 45		26,239 15
1873-74								29,980 80		29,980 80
1874-75								27,641 15		27,641 15
1875-76								8,865 94		8,865 94
1876-77								140,755 02		140,755 02
1877-78								139,584 40		139,584 40
1878-79								234,732 93		234,732 93
1879-80								206,801 37	4,636 08	202,165 29
1880-81								206,990 54	5,038 22	201,952 32
1881-82	2,245 00		40 00			354,036 17		1,805,734 87	10,687 55	1,795,047 32
1882-83	22,844 43		913 91			248,492 01		1,051,103 60	8,746 05	1,042,657 55
1883-84	11,370 60		640 90			253,713 40		1,001,776 67	9,220 50	992,556 17
1884-85	17,089 75		815 63			1,214 22		451,564 65	12,070 85	439,493 80
1885-86	29,562 51	3,131 08	1,284 83					457,973 95	63,389 12	394,584 83
1886-87	14,242 77	39,487 67	1,570 40	80 00				588,532 80	19,543 16	568,989 64
1887-88	5,922 47	23,023 28	2,273 73	80 00	2,951 58		10,000 00	569,986 68	6,277 66	563,709 02
1888-89	2,207 69	16,802 63	3,946 55		2,528 73		16,000 00	594,088 04	5,226 23	588,861 81
1889-90	1,305 57	9,021 63	9,242 08		1,694 37			462,536 26	8,209 74	454,326 52
1890-91	3,079 55	16,193 77	8,628 44	160 00	2,397 35	5 28	4,460 50	460,990 76	7,195 27	453,795 49
1891-92	3,726 80	17,222 60	5,616 85		3,648 45			452,151 08	15,291 39	436,859 69
1892-93	6,380 80	11,542 39	6,266 13		4,983 23			392,324 43	18,314 97	374,009 46
1893-94	5,740 79	7,687 86	6,243 15		2,523 92			250,069 12	4,544 01	245,525 11
1894-95	5,353 72	8,628 00	5,229 54		2,321 87			202,983 10	4,365 99	198,617 11
1895-96	7,071 86	6,255 90	5,813 51		2,734 82			227,691 93	8,368 79	219,326 14
1896-97	4,715 01	2,500 00	8,518 18		2,132 11			206,853 57	15,010 54	191,843 03
1897-98	4,728 58	510 39	699,334 76		3,045 65			1,009,741 63	4,678 55	1,005,063 08
1898-99	5,245 88		1,130,371 60		2,994 16			1,584,328 32	32 296 39	1,552,031 93
1899-1900	8,382 86	4,083 30	1,038,195 42	20 00	2,727 60			1,503,743 00	23,062 28	1,480,680 72
1900-1901	4,726 28	14,671 99	1,101,808 33	20 00	4,047 31			1,874,159 09	18,368 85	1,855,790 24
1901-1902	7,292 46	8,409 27	737,878 43		*2,861 13			1,432,679 25	27,165 55	1,405,513 70
1902-1903	13,913 33	15,041 33	607,722 05		*5,063 69			1,890 886 83	21,519 84	1,869,366 99
1903-1904	19,790 27	15,202 15	495,579 18		*9,198 48			1,681,824 70	36,721 75	1,645,102 95
1904-1905	36,145 32	5,237 36	364,923 59		*14,059 55			1,339,382 35	25,786 90	1,313,595 45
1905-1906	51,583 89	80 00	296,769 19		18,883 83			1,709,315 28	33,418 36	1,675,896 92
1906-1907 (nine months)	43,711 91	400 00	213,852 59		*15,887 42			1,490,503 31	35,117 48	1,455,385 83
1907-1908*	43,211 78	4,048 01	266,415 31		27,232 87			2,094,579 17	115,080 04	1,979,499 13

1908–1909	53,312 79	3,257 84	252,972 17	.....	31,321 20	.....	....	2,277,678 09	102,463 78	2,175,214 31
1909–1910	67,434 29	5,081 47	460,154 29	.....	43,264 36	.....	....	3,022,446 13	121,431 15	2,901,014 98
1910–1911	60,702 80	2,356 00	774,569 27	.....	69,054 59	.....	.....	3,306,073 41	198,689 47	3,107,383 94
1911–1912	69,519 41	1,520 00	729,240 42	.....	56,497 74	.....	.....	3,978,036 73	197,641 35	3,780,405 38
1912–1913	79,412 76	.... ..	779,695 53	1,587 32	37,448 72	.....	.....	3,655,202 20	246,105 26	3,409,096 94
1913–1914	84,926 15	320 00	889,863 15	.....	48,800 33	.....	.....	3,313,849 65	277,309 33	3,036,540 32
1914–1915	101,710 58	400 00	1,600,455 09	....	37,895 97	.. . .	....	3,176,851 36	317,764 75	2,859,086 61
Total	898,610 66	212,115 92	42,506,844 20	1,947 32	457,601 63	857,461 08	30,460 50	50,539,506 61	2,060,747 20	48,478,759 41

* Including scrip.

STATEMENT showing Yearly the Gross Revenue (in cash only) received from all sources from July 1, 1895 to March 31, 1915.

Fiscal Year.	Dominion Lands.	School lands.	Seed Grain.	Ordnance Lands.	Fines and Forfeitures.	Registration Fees.	Casual Revenue	Chinese Immigration Revenue	Total.
	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
1895-1896	174,509 38	56,584 32	8,748 05	17,550 28	502 00	8,737 87	1,920 66		268,552 56
1896-1897	187,424 19	24,292 43	9,887 13	9,831 27	1,316 00	8,997 24	2,683 05		244,431 31
1897-1898	980,313 10	52,410 82	12,351 71	22,537 17	529 06	14,263 50	260 92		1,082,666 28
1898-1899	1,563,020 74	41,249 77	12,388 69	12,349 65	2,801 03	19,220 73	2,620 91		1,653,651 52
1899-1900	1,410,883 48	220 874 78	15,271 84	11,043 53	1,452 92	21,751 90	3,664 00		1,681,942 45
1900-1901	1,533,197 07	48,049 83	15,711 63	14,604 47	1,977 96	33,979 77	1,587 57		1,649,108 30
1901-1902	1,254,333 56	193,410 75	20,293 06	16,967 36	1,955 61	50,854 99	3,900 62		1,541,715 95
1902 1903	1,716,597 20	392,206 93	28,789 97	17,612 79	5,220 88	81,404 18	2,230 26		2,244,062 21
1903-1904	1,478,106 33	233,769 62	26,122 30	30,494 34	5,911 92	109,233 73	3,402 94		1,887,041 18
1904-1905	1,314,485 40	332,914 48	16,471 34	10,346 90	10,918 49	123,082 86	4,258 14		1,811,577 61
	11,612,870 45	1,595,763 73	166,035 72	163,337 76	31,685 87	471,526 77	26,529 07		14,067,749 37
1905-1906	1,701,580 71	608,960 79	12,577 29	10,893 17	3,304 77	180,310 73	8,496 09		2,526,123 55
1906-1907 (9 mos)	1,478,749 51	724,353 73	10,850 06	6,663 90	21 00	46,124 20	11,785 81		2,278,548 21
1907-1908	1,998,219 92	708,045 83	12,899 84	8,674 95	1,650 00	2,256 65	20,069 03		2,751,816 22
1908-1909	2,254,283 98	687,422 74	53,590 86	205,749 96	281 00	1,352 13	26,224 29		3,228,904 96
1909-1910	3,007,390 82	1,292,259 95	175.152 72	189,902 48	211 00	1,471 49	42,625 96		4,709,014 42
1910-1911	3,302,279 57	1,614,733 93	153,351 14	6,009 34	1,052 22	1,378 19	11,336 06		5,093,140 45
1911-1012	3,973,259 74	1,594,533 96	119,634 13	11,566 46	10,510 48	1,066 05	32,824 65	971,339 00	6,714,734 47
1912-1913	3,647,457 61	1,621,508 11	171,342 87	60,607 80	7,150 35	1,241 25	22,873 55	3,549,242 00	9,081,423 54
1913-1914	3,313,259 65	1,215,822 37	176,736 89	5,805 98	7,888 50	966 50	27,884 47	2,644,593 00	7,392,957 36
1914-1915	3,177,386 73	943,717 00	68,263 56	4,416 64	5,828 00	969 85	11,738 10	588,124 00	4,800,143 88
	27,853,868 21	11,011,358 41	954,399 36	510,290 68	10,897 32	237,137 04	215,858 91	7,753,298 00	48,577,107 06
Increases	06,240,997 79	9,415,594 68	788,363 61	346,952 92	9,211 45		189,328 94	7,753,298 00	34,509,357 69
Decreases						234,389 73			

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STATEMENT of Revenue Collected within the Canadian National Parks for the fiscal year ended March 31, 1915, as compared with revenue for previous year.

Particulars.	Fiscal Years.		Increase.	Decrease.	Net Decrease.
	1914-15.	1913-14.			
Banff Park.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
Rent	7,659 62	9,113 63		1,454 01	
Timber dues	1,538 76	3,555 89		2,017 13	
Water rates (sulphur)	1,072 30	852 20	220 10		
Cold water rates	6,994 57	5,730 32	1,264 25		
Sewer rates	2,687 26	1,387 13	1,300 13		
Transfer fees	98 00	140 00		42 00	
Cave and basin bathing tickets	4,315 90	6,125 25		1,809 35	
Livery licenses	934 00	1,064 00		130 00	
Pool, billiard and bowling licenses	370 00	280 00	90 00		
Boat licenses	122 00	153 00		31 00	
Butcher licenses	70 00	60 00	10 00		
Grazing lands	331 10	277 63	53 47		
Hot Springs bathing tickets	4,034 45	5,873 35		1,838 90	
Telephone rent	2,159 14	2,072 90	86 24		
Fines	432 85	366 00	66 85		
Peddlers' licenses	94 00	164 00		70 00	
Camping permits	79 00	79 00			
Guides' licenses	70 00	75 00		5 00	
Sales of town lots	837 75	6,182 80		5,345 05	
Cemetery lots	59 00	69 00		10 00	
Tea room licenses	220 00	220 00			
Hay dues		7 75		7 75	
Sand	16 25	27 50		11 25	
Rent of water-power		300 00		300 00	
Dog licenses	281 00		281 00		
Automobile licenses	203 00		203 00		
Scales	21 50		21 50		
Ice	271 60		271 60		
Sale of lime	15 25		15 25		
Theatre license	37 00		37 00		
Building permits	33 00		33 00		
Miscellaneous	321 91	980 00		658 09	
	35,380 21	45,156 35	3,953 39	13,729 53	
Jasper Park.					
Timber dues	64 65	1,516 67		1,452 02	
Rent	628 00	423 00	205 00		
Building permits	15 00		15 00		
Boat licenses and ferry fees		31 25		31 25	
Hay dues		17 00		17 00	
Store licenses	30 00		30 00		
Peddlers' licenses	12 00	23 00		11 00	
Restaurant licenses	30 00	20 00	10 00		
Grazing		15 00		15 00	
Guides' licenses	10 00	45 00		35 00	
Drivers' and Livery licenses	74 00	115 00		41 00	
Camping permits	2 00	10 00		8 00	
Pool, billiard and bowling licenses	110 00	110 00			
Fines	55 00	285 00		230 00	
Shooting gallery licenses	10 00		10 00		
Dog licenses	101 00		101 00		
Miscellaneous	80 00	100 25		26 25	
	1,221 65	2,711 17	371 00	1,860 52	
Glacier Park.					
Rent	345 71		345 71		

STATEMENT of Revenue collected within the Canadian National Parks, etc.—*Con.*

Particulars.	Fiscal Years.		Increase.	Decrease.	Net Decrease.
	1914-15.	1913-14.			
	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
Yoho Park.					
Timber dues	205 00	9 50	195 50		
Rentals	388 25	687 91		299 66	
Transfer fees	14 00	10 50	3 50		
Camping permits	10 00		10 00		
Cemetery lots	6 00		6 00		
Grazing	30 00		30 00		
Ice	0 50		0 50		
Building permits	2 00		2 00		
Miscellaneous	0 50	10 00		9 50	
	656 25	717 91	247 50	309 16	
Waterton Lakes Park.					
Rent	78 46	97 50		19 04	
Camping permits	72 00	47 00	25 00		
Timber dues	59 75		59 75		
Restaurant licenses	10 00	10 00			
Fines	20 00		20 00		
Hay dues	17 25		17 25		
	257 46	154 50	122 00	19 04	
Elk Island Park.					
Timber dues		8 40		8 40	
Camping permits	5 00	7 00		2 00	
Coal royalty and fees		45 00		45 00	
	5 00	60 40		55 40	
Buffalo Park.					
Hay dues	1 00		1 00		
Miscellaneous	21 69		21 69		
	22 69		22 69		
Revelstoke Park.					
Timber dues	7 00		7 00		
Total	37,895 97	48,800 33	5,069 29	15,973 65	10,904 36

COMPARATIVE STATEMENT of the Homestead Entries and Sales made during the fiscal years ending March 31, 1914, and March 31, 1915, respectively.

	Fiscal Year ending March 31, 1914.		Fiscal Year ending March 31, 1915.	
	No. of Entries.	Acres.	No. of Entries.	Acres.
Homesteads	31,829	5,092,640	24,088	3,854,080
Sales	782	43,007	724	25,702

STATEMENT showing the number of Homestead Entries reported in each year since 1874.

Departmental Year ended—	Number of Entries.
October 31, 1874	1,376
" 31, 1875	499
" 31, 1876	347
" 31, 1877	845
" 31, 1878	1,788
" 31, 1879	4,068
" 31, 1880	2,074
" 31, 1881	2,753
" 31, 1882	7,483
" 31, 1883	6,063
" 31, 1884	3,753
" 31, 1885	1,858
" 31, 1886	2,657
" 31, 1887	2,036
" 31, 1888	2,655
" 31, 1889	4,416
" 31, 1890	2,955
" 31, 1891	3,523
" 31, 1892	4,840
" 31, 1893	4,067
" 31, 1894	3,209
December 31, 1895	2,394
" 31, 1896	1,857
" 31, 1897	2,384
" 31, 1898	4,848
" 31, 1899	6,689
June 30, 1900	7,426
" 30, 1901	8,167
" 30, 1902	14,673
" 30, 1903	31,383
" 30, 1904	26,073
" 30, 1905	30,819
" 30, 1906	41,869
Nine months ended March 31, 1907	21,647
Year ended March 31, 1908	30,424
" " " 31, 1909	39,081
" " " 31, 1910	41,568
" " " 31, 1911	44,479
" " " 31, 1912	39,151
" " " 31, 1913	33,699
" " " 31, 1914	31,829
" " " 31, 1915	24,088

STATEMENT showing the number of Homestead Entries made during the fiscal years ended March 31, 1914 and 1915, and the Nationality of the Homesteads as reported by the several Agencies of the Department in Manitoba, Saskatchewan, Alberta and British Columbia.

Nationalities.	No. of Entries 1914.	No. of Entries 1915.
Canadians from Ontario	2,996	2,009
" " Quebec	883	648
" " Nova Scotia	258	196
" " New Brunswick	182	117
" " Prince Edward Island	105	60
" " Manitoba	889	1,032
" " Saskatchewan	709	383
" " Alberta	551	434
" " British Columbia	104	76
Persons who had previous entry	4,411	3,639
Newfoundlanders	6	15
Canadians returned from the United States	121	48
Americans	7,172	4,286
English	3,894	2,974
Scotch	966	800
Irish	400	363
French	343	251
Belgians	143	109
Swiss	91	83
Italians	96	108
Roumanians	82	38
Syrians	29	16
Austro-Hungarians	887	474
Germans	2,516	2,879
Hollanders	143	104
Danes (other than Icelanders)	245	149
Icelanders	50	70
Swedes	842	628
Norwegians	1,062	645
Russians	1,586	1,332
Turks	5	8
Serbians	4	4
Bulgarians	7	5
Chinese	5	3
Japanese	3	7
Persians	..	2
Australians	13	4
New Zealanders	6	3
Hindoos	4	5
Hebrews	6	45
Greeks	2	20
Montenegrins	..	2
Hawaians	1	1
West Indies	3	1
South Americans	1	..
Arabians	1	..
Algerians	3	..
South Africans	3	3
West Africans	.	1
Spanish	..	7
Brazilians	..	1
Maltese	..	1
Total	31,829	24,088

Number of souls represented by above enteries: 74,246 in 1914.
Number of souls represented by above enteries: 56,218 in 1915.

STATEMENT showing the number of Homestead Entries made during the fiscal years ended March 31, 1914 and 1915, by persons coming from the various States and Territories of the American Union.

States.	No. of Entries 1914.	No. of Entries 1915.
Alabama	11	6
Alaska	2	1
Arkansas	10	21
California	67	46
Carolina, North	32	15
Carolina, South	14	2
Colorado	36	24
Columbia, District of	..	..
Connecticut	17	13
Dakota, North	1,180	751
Dakota, South	450	239
Delaware	1	..
Florida	1	.
Georgia	5	2
Idaho	45	42
Illinois	411	221
Indiana	174	100
Indian Territory	..	..
Iowa	560	283
Kansas	173	133
Kentucky	51	35
Louisiana	10	7
Maine	44	22
Maryland	19	7
Massachusetts	103	44
Michigan	429	247
Minnesota	1,159	740
Mississippi	2	2
Missouri	207	141
Montana	136	70
Nebraska	236	145
New Hamsphire	3	1
New Jersey	18	16
New Mexico	13	11
New York	6	..
Ohio	227	134
Oklahoma	192	99
Oregon	64	43
Pennsylvania	85	74
Rhode Island	133	87
Tennessee	17	15
Texas	24	15
Utah	47	39
Vermont	13	5
Virginia	18	10
Virginia, West	41	16
Washington	17	4
Wisconsin	282	144
Wyoming	492	253
	16	9
	7,293	4,334

STATEMENT showing the number of Letters Patent issued by the Department of the Interior for Dominion Lands since 1873, and the number of acres patented.

Period.	Number of Patents issued.	Acreage.
1873, May to 31st December	420	67,200
1874, 1st January to 31st December	577	92,320
1875, 1st January to 31st October	464	74,240
1876, year ended 31st October	318	50,880
1877, " " "	2,437	478,840
1878, " " "	2,357	462,880
1879, " " "	2,663	426,080
1880, " " "	1,084	173,440
1881, " " "	1,885	400,862
1882, " " "	2,197	506,785
1883, " " "	4,341	831,341
1884, " " "	3,896	909,604
1885, " " "	3,533	898,464
1886, " " "	4,570	942,055
1887, " " "	4,599	1,071,364
1888, " " "	3,275	647,644
1889, " " "	3,282	661,636
1890, " " "	3,273	626,019
1891, " " "	2,449	411,073
1892, " " "	2,955	549,257
1893, " " "	2,936	502,601
1894, " " "	2,553	420,238
1894, November and December	413	66,102
1895, year ended 31st December	2,118	348,964
1896, " " "	2,665	531,861
1897, " " "	2,972	499,859
1898, " " "	3,037	646,671
1899, " " "	3,904	714,748
1900, 1st January to 30th June		
1901, year ended 30th June	6,461	6,846,857
1902, " " "	8,768	4,711,104
1903, " " "	7,349	3,266,388
1904, " " "	6,890	2,982,579
1905, " " "	8,798	6,197,354
1906, " " "	12,370	4,181,345
1st July, 1906, to 31st March, 1907	10,596	2,361,330
1908, year ended 31st March	18,690	6,138,977
1909, " " "	22,431	4,215,326
1910, " " "	22,854	3,662,259
1911, " " "	21,754	3,710,288
1912, " " "	19,354	3,155,388
1913, " " "	24,965	4,209,388
1914, " " "	31,053	5,192,141
1915, " " "	24,260	3,996,013
	319,736	79,150,266

STATEMENTS showing number of Homestead Entries granted in the Provinces of Manitoba, Saskatchewan, Alberta and British Columbia for fiscal year 1914-1915, as compared with fiscal year 1913-1914.

MANITOBA.

Agency.	1914-15.	1913-14.	Increase.	Decrease.	Total 1914-15.	Total 1913-14.	Increase 1914-15.	Decrease 1913-14.
Brandon	48	43	5					
Dauphin	1,313	799	514					
Winnipeg	3,059	2,344	715					
Total	4,420	3,186	1,234		4,420	3,186	1,234	

SASKATCHEWAN.

Battleford	1,244	1,650		406				
Estevan	50	218		168				
Humboldt	768	930		162				
Maple Creek	992	2,775		1,783				
Moose Jaw	1,183	2,000		817				
Prince Albert	1,567	2,189		622				
Regina	131	232		101				
Saskatoon	815	1,288		473				
Swift Current	732	2,041		1,309				
Weyburn	445	409	36					
Yorkton	863	772	91					
Total	8,790	14,504	127	5,841	8,790	14,504		5,714

ALBERTA.

Calgary	989	1,755		766				
Edmonton	5,629	5,745		116				
Grand Prairie	898	818	80					
Lethbridge	257	388		131				
Medicine Hat	447	1,158		711				
Peace River	1,061	1,226		165				
Red Deer	795	1,118		323				
Total	10,076	12,208	80	2,212	10,076	12,208		2,133

BRITISH COLUMBIA.

Kamloops	446	1,402		956				
New Westminster	219	529		310				
Revelstoke	137		137					
Total	802	1,931	137	1,266	802	1,931		1,129

Grand total for fiscal year 1914-15 24,088
" " 1913-14 31,829
Net decrease for fiscal year 1914-15 7,741

CORRESPONDENCE.

The following statement shows the number of letters received and sent by the department in each year since its establishment.

Departmental Year ended October 31.	Letters Sent.	Letters Received.	Total.
1874	3,482	4,120	7,632
1875	1,974	2,189	4,163
1876	2,256	3,097	5,353
1877	3,137	3,677	6,814
1878	4,642	6,009	10,651
1879	5,586	6,179	11,755
1880	8,222	9,910	18,162
1881	13,605	15,829	29,434
1882	25,500	30,300	55,800
1883	27,180	33,500	60,680
1884	27,525	33,386	60,911
1885	33,970	43,997	77,967
1886	60,964	67,973	128,937
1887	47,845	60,890	108,735
1888	43,407	52,298	95,705
1889	48,316	50,500	98,816
1890	36,200	36,008	72,208
1891	38,000	36,267	74,267
1892	41,990	42,203	84,193
1893	50,794	48,145	98,939
1894	48,619	50,840	99,459
1895	49,991	45,898	95,889
1896	47,501	44,238	91,739
1897	65,714	64,147	129,861
1898	88,913	87,845	176,758
1899	95,023	91,876	186,899
1900	121,219	133,177	254,396
1901	144,978	136,348	281,326
1902	167,200	185,548	352,748
1903 (From June 30, 1902, to July 1, 1903)	185,582	223,463	409,045
1904 (From June 30, 1903, to July 1, 1904)	222,316	274,675	496,991
1905 (From June 30, 1904, to July 1, 1905)	245,470	302,723	548,193
1906 (From June 30, 1905, to July 1, 1906)	407,794	529,465	937,259
1907 (From June 30, 1905, to April 1, 1907)	372,231	620,968	993,199
1908 (From March 31, 1907, to April 1, 1908)	543,647	1,106,772	1,650,419
1909 (From March 31, 1908, to April 1 1909)	721,217	1,114,380	1,835,597
1910 (From March 31, 1909, to April 1, 1910)	935,217	1,174,546	2,109,763
1911 (From March 31, 1910, to April 1, 1911)	1,027,933	1,280,697	2,308,630
1912 (From March 31, 1911, to April 1, 1912)	1,224,316	1,304,904	2,529,220
1913 (From March 31, 1912, to April 1, 1913)	1,292,188	1,438,912	2,731,100
1914 (From March 31, 1913, to April 1, 1914)	1,189,377	1,304,075	2,493,452
1915 (From March 31, 1914, to April 1, 1915)	1,013,071	996,205	2,009,276

The number of registered letters during the departmental year ending March 31, 1915, was: received, 29,234; sent, 28,259.

STATEMENT of Land Sales by Railway Companies having Government

Year.	Hudson's Bay Company.		Canadian Pacific Railway Company.		Manitoba South-western Colonization Railway Company.		Qu'Appelle, Long Lake and Saskatchewan Railroad and Steamboat Company.	
	Acres.	Amount.	Acres.	Amount.	Acres.	Amount.	Acres.	Amount.
		$		$		$		$
1893			93,184	295,288	14,164	57,559	1,603	
1894	7,526	48,225	43,155	131,628	6,312	28,603	640	
1895	4,431	23,209	55,453	176,950	5,623	22,330	2,391	
1896	9,299	52,419	66,624	220,360	21,254	88,538	286	
1897	10,784	53,277	135,681	431,095	63,800	234,644	2,524	
1898	62,000	310,000	242,135	757,792	106,473	363,982	22,534	
1899	56,875	274,625	261,832	814,857	58,019	199,458	61,050	178,517
(Fiscal Year) 1900	70,196	352,631	379,091	1,152,836	133,507	437,449	18,932	53,974
(Fiscal Year) 1901	82,308	399,804	339,985	1,046,665	59,749	214,953	22,266	74,810
(Fiscal Year) 1902	269,577	1,412,332	1,362,478	4,440,500	206,411	713,365	39,835	147,365
(Fiscal Year) 1903	330,046	1,939,804	2,260,722	8,472,250	250,372	699,210	843,900	1,476,900
(Fiscal Year) 1904	144,857	879,910	857,474	3,516,864	29,522	113,303		
(Fiscal Year) 1905	139,721	865,905	411,451	2,045,800	80,342	296,936		
(Fiscal Year) 1906	236,191	1,863,375	1,012,322	6,015,060	83,418	360,889		
(9 months to March 31, 1907)	69,158	742,221	851,083	4,817,632	3,051	22,645	1,353	16,789
(Fiscal Year) 1908	21,184	267,215	81,060	727,367	31,982	153,007	5,621	68,869
(Fiscal Year) 1909	25,449	288,836	29,331	383,390	10,396	84,845	37,662	380,371
(Fiscal Year) 1910	104,382	1,297,454	655,585	10,473,425	14,501	126,930	106,000	964,600
(Fiscal Year) 1911	267,038	3,747,768	715,095	10,372,661	20,313	284,859	113,533	1,237,204
(Fiscal Year) 1912	42,554	818,943	855,280	12,420,488	18,932	117,497	35,213	495,116
(Fiscal Year) 1913	53,581	1,128,806	447,158	6,348,352	2,768	48,639	15,395	255,399
(Fiscal Year) 1914	26,292	572,837	265,962	4,242,089	7,626	91,948	1,629	21,546
(Fiscal Year) 1915	16,400	306,550	151,262	2,496,872	489	5,508	1,292	19,118
Totals	2,049,849	17,636,137	11,571,403	81,800,221	1,229,024	4,766,547	1,333,639	5,3 0,578

Land Grants, and by the Hudson's Bay Company.

Calgary and Edmonton Railway Company.		Canadian Northern Railway Company.		Great Northwest Central Railway Company.		Totals.		Average per Acre.
Acres.	Amount.	Acres.	Amount.	Acres.	Amount.	Acres.	Amount.	
	$		$		$		$	$ cts.
11,260						120,211	352,847	2 93
11,035						68,668	207,856	3 02
46,815						114,713	222,489	1 94
10,553						108,016	361,338	3 34
9,436						222,225	719,016	3 23
15,481						448,623	1,431,774	3 18
24,738	53,335					462,494	1,520,792	3 28
46,653	128,256					648,379	2,125,146	3 27
116,719	352,037					621,627	2,088,269	3 36
323,494	1,033,396					2,201,795	7,746,958	3 56
231,800	909,600	183,736	631,503	128,435	522,490	4,229,011	14,651,757	3 46
129,007	563,507	64,469	313,575	41,858	177,081	1,267,187	5,564,240	4 39
109,191	512,898	231,707	1,221,469	17,593	163,564	990,005	5,046,572	5 09
85,784	480,063	204,966	1,014,351	20,003	137,503	1,642,684	9,871,241	6 01
59,515	346,064	289,576	1,711,109	4,023	41,470	1,277,759	7,697,930	6 02
8,606	75,644	196,946	1,746,504	1,294	13,855	346,693	3,052,461	8 80
6,370	66,508			165	7,935	109,373	1,211,885	11 08
18,323	182,926	285,428	2,783,010	571	6,863	1,184,790	15,835,228	13 36
11,820	116,231	277,414	3,336,797	1,438	27,417	1,406,651	19,122,937	13 59
10,853	154,421	365,926	4,216,578	632	11,373	1,329,390	18,224,419	13 70
4,155	44,212	182,491	2,009,642	1,601	32,105	707,149	9,867,155	13 95
19,575	460,129	182,491	2,009 642			501,575	7,398,191	14 75
23,042	444,018			316	6,965	172,801	3,279,031	17 01
1,334,225	5,923,248	2,465,150	20,193,180	217,929	1,088,621	20,201,219	137,599,532	6 81

THE LAND SITUATION of Manitoba, Saskatchewan and Alberta, corrected to January 1, 1915.

TOTAL AREA, in acres.

Province.	Land.	Water.	Total.
Manitoba	143,570,698	17,601,600	161,172,298
Saskatchewan	152,340,320	8,747,680	161,088,000
Alberta	158,878,660	4,503,740	163,382,400
Totals	454,789,678	30,853,020	485,642,698

SURVEYED AREA, in acres.

Province.	Land.	Water.	Total.
Manitoba	30,737,802	3,821,177	34,558,979
Saskatchewan	77,360,000	1,858,076	79,218,076
Alberta	79,406,876	2,157,795	81,564,671
Totals	187,504,678	7,837,048	195,341,726

Disposition of the Surveyed Area.

The two following statements, "Area available for cultivation" and "Area not available for cultivation", taken together, show the disposition of the surveyed area.

AREA AVAILABLE FOR CULTIVATION.

(Surveyed area.)

	Manitoba.	Saskatchewan.	Alberta.	Total.
	Acres.	Acres.	Acres.	Acres.
Area under homesteads (including military homesteads)	7,795,000	26,608,000	17,484,000	51,887,000
Area under pre-emption and purchased homesteads	.....	5,510,000	2,972,000	8,482,000
Area under Northwest half-breeds scrip, sales and special grants	4,229,500	2,258,800	1,189,600	7,677,900
Area granted to railway companies	3,566,997	15,177,063	13,120,014	31,864,074
Area granted to Hudson's Bay Company	1,416,200	3,183,500	2,198,100	6,797,800
Area of school land endowment	1,517,800	3,933,600	3,250,600	8,702,000
Area sold under irrigation system	.....	75,960	979,688	1,055,648
Area of Manitoba swamp lands disposed of by the province	848,154	.....	.....	848,154
Area of parish and river lots	487,602	82,217	117,777	687,596
Area of Indian reserves	437,003	1,212,482	1,342,687	2,992,172
Area of Indian reserves surrendered	83,665	331,017	301,654	716,336
Area now available for entry	5,575,000	8,000'000	14,500,000	28,075,000
Totals	25,956,921	66,372,639	57,456,120	149,785,680

Area not Available for Cultivation.

(Surveyed Area.)

—	Manitoba.	Saskatchewan.	Alberta.	Total.
	Acres.	Acres.	Acres.	Acres.
Area under timber licenses	1,208,000	1,417,000	1,474,000	4,099,000
Area under grazing leases	15,500	1,922,000	2,457,000	4,394,500
Area of forest reserves and parks	2,606,400	6,195,700	16,813,400	25,615,500
Area of road allowances	950,981	1,452,661	1,206,356	3,609,998
Area of water-covered lands	3,821,177	1,858,076	2,157,795	7,837,048
Totals	8,602,058	12,845,437	24,108,551	45,556,046

Unsurveyed Area.

Province.	Land.	Water.	Total.
	Acres.	Acres.	Acres.
Manitoba	112,832,896	13,780,423	126,613,319
Saskatchewan	74,980,320	6,889,604	81,869,924
Alberta	79,471,784	2,345,945	81,817,729
Totals	267,285,000	23,015,972	290,300,972

A large proportion of the unsurveyed area has not yet been explored except in a very partial way, and the area suitable for agriculture cannot be estimated with any degree of accuracy.

Area of Field Crops, 1914.

—	Manitoba.	Saskatchewan.	Alberta.	Total.
	Acres.	Acres.	Acres.	Acres.
Area under wheat	2,616,000	5,348,300	1,371,100	9,335,400
Area under oats	1,331,000	2,520,000	1,502,000	5,353,000
Area under barley	468,000	290,000	178,000	936,000
Area under flax	40,000	958,000	80,000	1,078,000
Area under other products	216,790	121,700	238,170	576,660
Totals	4,671,790	9,238,000	3,369,270	17,279,060

"Other products" include the following:—Rye, Peas, Mixed Grains, Potatoes, Turnips, etc., Hay and Clover, Fodder Corn, and Alfalfa.

STATEMENT showing Area under Field Crops in Manitoba, Saskatchewan and Alberta, 1908-1914, in Acres.

Provinces.	1908	1909	1910	1911	1912	1913	1914
Manitoba	5,116,000	5,051,503	4,594,784	5,134,087	4,971,400	4,965,500	4,671,790
Saskatchewan	3,552,643	5,814,923	6,817,841	8,644,102	10,515,800	10,307,600	9,238,000
Alberta	1,996,300	1,483,400	1,999,963	3,351,745	3,603,060	3,690,100	3,369,270
Totals	11,664,943	12,359,826	13,412,588	17,129,934	18,890,260	18,963,200	17,279,060

GRAIN PRODUCTION of Manitoba, Saskatchewan and Alberta, 1908-1914, in Bushels.

Province.	1908.	1909.	1910.	1911.	1912.	1913.	1914.
Manitoba	112,487,000	129,255,000	71,230,477	138,994,000	137,432,004	125,171,000	80,852,000
Saskatchewan	67,084,000	183,311,000	132,879,172	233,137,500	257,266,000	261 823,000	146,425,500
Alberta	33,873,000	54,215,000	27,868,011	101,592,000	110,288,000	113,882,500	91,795,900
Totals	213,444,900	366,781,000	231,977,660	473,723,500	504,986,004	500,876,500	319,073,400

WHEAT PRODUCTION of Manitoba, Saskatchewan and Alberta, 1908-1914, in Bushels.

Province.	1908.	1909.	1910.	1911.	1912.	1913.	1914.
Manitoba	50,269,030	52,706,000	34,125,949	62,689,000	63,017,000	53,331,000	38,605,000
Saskatchewan	34,742,000	85,197,000	66,978,996	109,075,000	106,960,000	121,559,000	73,494,000
Alberta	6,842,000	9,579,000	9,060,210	36,602,000	34,303,000	34,372,000	28,859,000
Totals	91,853,030	147,482,000	110,165,155	208,366,000	204,280,000	209,262,000	140,958,000

It is interesting to note, in connection with the wheat production, that the annual report of the Department of the Interior for the year 1891 gives the wheat production of what now is Manitoba, Saskatchewan and Alberta as thirty million bushels.

GRAIN PRODUCTION of Manitoba, Saskatchewan and Alberta, 1914, in Bushels.

—	Wheat.	Oats.	Barley.	Rye.	Other Grains.	Flax.
Manitoba	38,605,000	31,951,000	9,828,000	100,000	30,000	338,000
Saskatchewan	73,494,000	61,816,000	4,901,000	54,000	29,500	6,131,000
Alberta	28,859,000	57,076,000	4,806,000	360,800	80,100	664,000
Totals	140,958,000	150,843,000	19,535,000	514,800	139,600	7,083,000

GENERAL DEVELOPMENT.

The development of Western Canada, on lines other than the production of grain, is indicated by the following statements:—

CAPACITIES of Licensed Elevators, in Bushels.

Fiscal Year.	Manitoba.	Saskatchewan.	——	Alberta.	Totals.
1900-01	10,323,272		N.W.-T. 2,436,080		12,759,352
1901-02	12,255,000		" 3,194,000		15,449,000
1902-03	16,121,400		" 5,105,000		21,226,400
1903-04	19,297,000		" 7,917,000		27,214,000
1904-05	19,557,630		" 8,934,000		28,491,630
1905-06	20,656,100	8,951,600		1,715,500	31,3 3,200
1906-07	20,502,200	12,989,500		2,785,500	36,277,200
1907-08	21,015,600	14,666,500		3,818,900	39,501,000
1908-09	20,558,500	17,924,500		4,386,400	42,8 9,400
1909-10	21,624,500	24,314,500		8,080,400	54,019,400
1910 11	21,813,800	26,465,000		8,764,500	57,043,300
1911-12	22,410,500	29,314,000		9,863,000	61,587,500
1912-13	22,253,150	36,503,000		11,565,500	70,321,650
1913-14	21,690,000	42,995,000		14,793,000	79,478,000
1914-15	22,045,500	48,074,500		16,089,000	86,209,000

The above figures do not include capacities of hospital and terminal elevators.

STATEMENT of numbers of Farm Livestock in Manitoba, Saskatchewan and Alberta, 1910-1914.

Province.	1910.	1911.	1912.	1913.	1914.
Manitoba.—					
Horses	244,987	280,374	293,776	304,088	316,707
Cattle	479,741	435,113	415,601	409,718	408,302
Sheep	30,266	37,322	40,809	42,840	45,303
Swine	142,312	188,416	183,370	184,745	186,276
Totals	897,306	941,225	933,547	941,391	956,588
Saskatchewan.—					
Horses	332,922	507,400	551,645	580,386	609,521
Cattle	569,619	633,612	646,140	663,098	679,060
Sheep	135,360	114,216	114,819	115,568	126,027
Swine	135,788	286,295	344,298	386,784	445,703
Totals	1,163,689	1,541,523	1,656,893	1,745,836	1,869,311
Alberta.—					
Horses	294,225	407,153	451,573	484,809	519,424
Cattle	1,051,407	739,850	745,229	779,293	812,100
Sheep	179,067	193,592	135,075	178,015	211,001
Swine	143,560	237,510	278,747	350,692	397,123
Totals	1,668,259	1,518,105	1,610,624	1,792,809	1,939,648

Value of Mineral Production.

(Calendar years.)

Province.	1910.	1911.	1912.	1913.	1914.
	$	$	$	$	$
Manitoba	1,500,359	1,791,772	2,463,074	2,214,496	2,428,902
Saskatchewan	498,122	636,706	1,165,642	881,142	710,840
Alberta	8,996,210	6,662,673	12,073,589	15,054,046	12,773,669
Totals	10,994,691	9,091,151	15,702,305	18,149,684	15,913,411

Railway Mileage.

Year.	Manitoba.	Saskatchewan.	Alberta.	Totals.
1901	2,056	1,107	978	4,141
1902	2,128	1,102	978	4,208
1903	2,224	1,117	978	4,319
1904	2,364	1,180	1,020	4,319
1905	2,672	1,523	1,020	5,215
1906	2,823	1,973	1,200	5,996
1907	3,074	2,025	1,323	6,422
1908	3,111	2,081	1,323	6,515
1909	3,205	2,631	1,321	7,157
1910	3,221	2,932	1,488	7,641
1911	3,466	3,121	1,494	8,081
1912	3,520	3,754	1,897	9,171
1913	3,993	4,651	2,212	10,856
1914	4,076	5,089	2,545	11,710

Branches of Canadian Chartered Banks.

Year.	Manitoba.	Saskatchewan.	——	Alberta.	Totals.
1901	52	....	N.W.T. 19	....	71
1902	53	....	" 23	....	76
1903	64	....	" 42	....	106
1904	86	....	" 74	....	160
1905	90	39	....	41	170
1906	104	48	....	49	201
1907	146	91	....	77	314
1908	161	116	....	89	366
1909	164	131	....	97	392
1910	171	187	....	140	498
1911	192	320	....	220	732
1912	195	378	....	253	826
1913	206	399	....	263	868
1914	205	404	....	261	870

STATEMENT showing Number of Immigrants whose destination was Manitoba, Saskatchewan and Alberta, 1900-1901 to 1913-1914.

Fiscal Year.	Manitoba.	Saskatchewan.	Alberta.	Totals.
1900- 1.	11,254	14,160		25,414
1901- 2.	17,422	22,199		39,621
1902- 3.	39,535	43,898		83,433
1903- 4.	34,911	40,397		75,308
1904- 5.	35,387	39,289		74,676
1905- 6.	35,648	28,728	26,177	90,553
*1906- 7.	20,273	15,307	17,559	53,139
1907- 8.	39,789	30,590	31,477	101,856
1908- 9.	19,702	22,146	27,651	69,499
1909-10.	21,049	29,218	42,509	92,776
1910-11.	34,653	40,763	44,782	120,198
1911-12.	43,477	46,158	45,957	135,592
1912-13.	43,813	45,147	48,073	137,033
1913-14.	41,640	40,999	43,741	126,380
1914-15.	13,196	16,173	18,263	37,632
Totals.	451,749	821,361		1,263,110

* For nine months ended March 31, 1907.

THE UNEXPLOITED NORTHWEST.

The unsurveyed areas of Manitoba, Saskatchewan and Alberta (consisting of the northernmost parts, and totalling in acres over 290,000,000, of which over 23,000,000 are water covered) are still practically unknown. Some information, of course, is obtained each year from surveyors, prospectors, explorers and hunters regarding the different portions of this large tract which have been traversed by them.

Slowly but surely this unknown region is being reduced, and each year finds a considerable area added to the surveyed portion and opened to homesteaders. It is found that this land, which a few years ago was regarded by many as absolutely useless from an agricultural point of view, is surprisingly productive, and all the hardier grains, including wheat, barley and oats, mature and produce large yields. Vegetables such as potatoes, cabbages, turnips and other roots bring good crops, and even such tender fruits as strawberries and raspberries are to be found. It is a well known scientific fact that the nearer to its extreme northern limit of production a cereal is grown the larger will be the yield.

It is being realized more and more each year that the great northern regions of Canada are capable of supporting a dense population, and comparisons show that parts of Europe and Asia, in the same latitudes and under climatic and other conditions somewhat similar to those of northwestern Canada, are supporting millions.

While the growing season is much shorter than in more southern latitudes, the fact is not appreciated by many that the longer day—about eighteen hours of sunlight in June and fifteen in August—counteracts the shortness of the summer, and all crops grow and mature in a much shorter space of time.

Areas of timber are being constantly exploited and along the shores of Hudson bay and in Rocky mountains discoveries of minerals, including gold, silver, copper, iron and gypsum, are rewarding the efforts of prospectors.

The rivers and lakes teem with fish, and these, with the abundant game, offer a means of sustenance to the pioneers who are opening up the country. Fur-bearing animals are plentiful, and prove a ready source of profit to settlers, trappers and hunters.

THE KEEWATIN AREA.

This comprises the region west of James bay and southwest of Hudson bay, being the southern portion of the area known up to the time of the creation of the provinces of Alberta and Saskatchewan as the district of Keewatin, and comprising the territory recently annexed to the provinces of Ontario and Manitoba.

Explorations, from points on Hudson bay principally, are proving that there is considerable land capable of producing cereals and roots, while berries, currants, etc., grow in profusion. The land is filled with lakes and rivers, providing transportation, although some of the streams are very swift and broken up by rapids.

The arable lands are in isolated blocks separated by ridges of swampy lands, which could be improved by drainage.

Fish abound in all the streams and lakes, while fur-bearing animals, such as the mink, marten, fox, beaver, and others, are to be found throughout the district.

Various minerals are obtained throughout the rocky portions of the country. Quartz veins appear on Grassy river below Reed lake, with evidences of nickel occurring.

NORTHERN MANITOBA.

The unsurveyed area of Manitoba, is over 126,000,000 acres, of which about 14,000,000 are water covered. This region contains some farming lands as good as any to be found in Western Canada, and a study of meteorological records indicates that the climate is as favourable for agriculture as that of Prince Albert.

Some fine stands of timber are found, but, as the country has been burnt over, most of the timber is small and suitable only for pulpwood—the commercial timber occurring in isolated parts which were untouched by the fires.

The remarks as to the Keewatin area also pertain to northern Manitoba, but chiefly to that portion which stretches to Hudson bay.

NORTHERN SASKATCHEWAN.

Northern Saskatchewan is fast disclosing its enormous agricultural possibilities, and with increasing facilities for transportation is rapidly filling up with settlers.

Success has attended the cultivation of practically all the cereals and vegetables, and many of the fruits grown in eastern Canada, and the country has been pronounced by competent authorities as capable of supporting a dense population.

The unsurveyed area amounts to over 81,000,000 acres of which about seven millions are water covered. A large tract of this land is to the south of Churchill river, where the greater part of the country is very fertile, as evidenced by the rank vegetation prevailing throughout. The country to the north of the Churchill is more rocky and has a sandy soil which will not give as good results in agriculture as that to the south of the river.

NORTHERN ALBERTA.

The surveyed part of the province of Alberta, which has been fully explored, extends considerably farther north than do the lines that mark the northern limit of the surveyed territory in Saskatchewan. The unsurveyed area amounts to over 81,000,000 acres, and of this about two and one half millions are water covered. The country is divided naturally into two regions—the basin of Athabaska river; and the country drained by Peace river, which is west of the 114th meridian, and extends to the mouth of the river. Hundreds of lakes and ponds, of which Lesser Slave lake, 70 miles in length, is the largest, are found in all parts of the country.

Several railways are now serving this country. The Canadian Northern railway is completed to Athabaska, and the Edmonton, Dunvegan and British Columbia railway is completed to McLennan (Round Lake). The latter railway is also under construction westward from McLennan to near Smoky river, and northward to Peace River Crossing.

Successive years of experiment have demonstrated the practicability of the growth of wheat, barley, oats, potatoes, cabbages and other products of the field and garden in both Athabaska and Peace river regions. Wheat grown at Chipewgan (north of latitude 58°, on Lake Athabaska) was awarded a medal at the Centennial exhibition at Philadelphia in 1876.

The country drained by Athabaska river is mainly a rolling plain partly covered with muskegs, and, with the exception of some areas of semi-prairie land, is well wooded with a forest composed mainly of spruce, fir, pine, tamarack, poplar, birch and willow.

The soil along the Athabaska for the most part is good. From McMurray to Lake Athabaska, a distance of 200 miles, the country has the appearance of a great alluvial plain. It is more or less timbered, but the soil is excellent.

The watershed of the Athabaska contains many large areas suitable for agriculture—notably the prairie east of the river between the 111th and 112th meridians, and other districts in the vicinity of Winefred, Cowpar, Garson, and Gordon lakes.

Athabaska river is navigable from Grand rapids to the south for 325 miles, and from McMurray to the north for 270 miles.

The westerly section of northern Alberta, or Peace River district, is attracting much attention on account of its remarkable agricultural possibilities, and the influx of settlers, which is steadily increasing in volume, has demonstrated practically that the promising reports of the district received in recent years have not been exaggerated.

Peace river drains a large district west of Rocky mountains, and then continuing eastward intersects the axis of that range and drains the country lying along its eastern slopes through four degrees of latitude. Its length from the confluence of Finlay and Parsnip rivers to the point at which it unites with the waters flowing from Lake Athabaska to form Slave river is 757 miles. The river has cut a trough-like valley from 500 to 1,000 feet in depth and from 2 to 3 miles in width. From the mountains to Peace Point, a distance of approximately 750 miles, following the winding of the river, there is a plateau on each side averaging 75 miles in width, the soil of which is equal to any on the Saskatchewan. It is chiefly a deep rich clay loam. The agricultural area in Peace River country will, on the whole, compare favourably with the remainder of the Dominion.

MACKENZIE RIVER REGION.

The length of this great river is 916 miles, and its width varies from 1 to 2 miles. It is navigable throughout its entire course for vessels of shallow draught.

The country which the river drains is of the most varied description. It includes part of the broken plateau region west of Rocky mountains; Rocky mountains themselves through fifteen degrees of latitude; the northern part of the prairie district; and the wooded and moss-covered country which succeeds it towards the Arctic ocean.

The amount of arable land is small compared to the total area, and is mostly confined to the vicinity of the larger streams. The alluvial lands along Slave river, the upper part of Mackenzie river, and the country bordering the Liard for some distance above and below Fort Liard and west of the mountains, are the best parts of the district.

IMMIGRATION.

The report of the Superintendent of Immigration will be found in Part II of the general report. The report made by the Superintendent of Immigration includes his report as Chief Controller of Chinese Immigration.

The following is a comparative statement of immigrant arrivals, from 1897 onward:—

—	British.	From U. S. A.	Other Countries.	Total.
Calendar year, 1897	11,383	2,412	7,921	21,716
" " 1898	11,173	9,119	11,608	31,900
" " 1899	10,660	11,945	21,938	44,543
First six months of 1900	5,141	8,543	10,211	23,895
Fiscal year 1900-1901	11,810	17,987	19,352	49,149
" 1901-1902	17,259	26,388	23,732	67,379
" 1902-1903	41,792	49,473	37,099	128,364
" 1903-1904	50,374	45,171	34,786	130,331
" 1904-1905	65,359	43,543	37,364	146,266
" 1905-1906	86,796	57,796	44,472	189,064
Fiscal period 1906-1907 (9 months)	55,791	34,659	34,217	124,667
Fiscal year 1907-1908	120,182	58,312	83,975	262,469
" 1908-1909	52,901	59,832	34,175	146,908
" 1909-1910	59,790	103,798	45,206	208,794
" 1910-1911	123,013	121,451	66,620	311,084
" 1911-1912	138,121	133,710	82,406	354,237
" 1912-1913	150,542	139,009	112,881	402,432
" 1913-1914	142,622	107,530	134,726	384,878
" 1914-1915	43,276	59,779	41,734	144,789

BRITISH IMMIGRATION.

During eight months of the fiscal year 1914-15, war raged in France, involving not only the British Isles, but the whole British Empire; it is not surprising, therefore, that British immigration fell off from 142,622 in 1913-14 to 43,276 during last fiscal year: the decrease is nearly 70 per cent.

CONTINENTAL IMMIGRATION.

A decrease from 134,726 to 41,734 in arrivals from Continental Countries during last fiscal year as compared with the preceding year may be accounted for in the same

way; the war having an even greater effect on immigration in countries where military conscription is enforced. During the four months, April to July, immediately preceding the outbreak of war, the total arrivals from continental countries numbered 38,389, while for the eight months after that date to the close of the fiscal year the total arrivals numbered only 3,345.

AMERICAN IMMIGRATION.

The decrease in immigration from the United States is not nearly so marked; during 1913-14, the number was 107,530, while for 1914-15, the total was 59,779, a decrease of slightly over 44 per cent, as compared with a decrease of 70 per cent of British immigration.

IMMIGRATION INSPECTION.

Reports will be included dealing with immigration inspection, and it is gratifying to note that there has been no relaxation in the enforcement of regulations pertaining to the admission and rejection of passengers along the international boundary, which, for convenience, is divided into five inspectorates.

JUVENILE IMMIGRATION.

The immigration of children, unaccompanied by parents or guardians, occupies a distinct and important place in the work of the Department, and comes under the immediate supervision of the Chief Inspector of British Immigrant Children and Receiving Homes, whose report of this phase of departmental work will furnish interesting reading.

DESCRIPTION OF THE WORK OF THE TOPOGRAPHICAL SURVEYS BRANCH.

Surveys of Dominion Lands were continued during the year in Manitoba, Saskatchewan, Alberta, the Yukon Territory, the Northwest Territories and the railway belt of British Columbia.

Seventy-three parties were employed, seventy-one working for the full season and two for a short time only. Of the seventy-one parties, fifty-three were employed under daily pay, four of whom worked on the inspection of surveys, eight on base lines and initial meridians, one on levelling, and the remaining forty on subdivisions, resurveys and miscellaneous surveys of various kinds. Eighteen parties were engaged under contract on township subdivision.

The parties were distributed as follows:

Parties.	In Manitoba.	In Saskatchewan.	In Alberta.	In British Columbia.	In Two Provinces.	Total.
Paid by the day	9	7	20	8	9	53
Under contract	2	.....	16	.....	.....	18
Engaged for a short time only	.....	1	.....	1	.....	2
Total	11	8	36	9	9	73

The number of parties investigating the changes in lakes and rivers in Manitoba, Saskatchewan and Alberta was increased to twelve, eight only being employed on this work during the previous year. These surveys enable the Department to issue accurate plans of the townships showing the actual areas of sections or quarter sections which were wholly or partially under water at the time of the original survey.

The commission for the delimitation of the interprovincial boundary between Alberta and British Columbia continued their work. The line is now marked across Kicking Horse, Vermilion, Simpson, Crowsnest and North Kootenay passes and the preliminary survey commenced at South Kootenay pass. A photo-topographic survey of the country on each side of the boundary was made at each pass where the line was established.

Owing to the advance of our surveys beyond settlement it was found that the number of parties on the original survey of base lines and initial meridians might be reduced: accordingly eight only were employed on these surveys in place of twelve the previous season; one party was employed on the retracement of old lines. The nine parties ran 1,204 miles of original line and retraced 1,039 miles of old surveys. As was the case during 1913 most of the original lines established were in the Peace River Valley and along the Hudson Bay railway.

Four thousand five hundred miles of lines of levels were run, making a total up to the present of nine thousand eight hundred miles. The information collected will be published in tabulated form.

The work of surveying settlements along Slave and Mackenzie rivers, begun in 1913, was completed last summer and the settler along these rivers will now be able to secure patents to the lands they occupy. In 1908 a townsite was laid out at Churchill on Hudson bay but the surveyor had to return home leaving the survey partly done. The work was completed last season.

The topographical survey of Jasper park in the vicinity of Jasper was continued and will be completed during the present season. A topographical survey of Crowsnest forest reserve undertaken at the request of the Forestry Branch was completed and a map of the reserve is now in preparation.

Resurveys in Alberta and Saskatchewan were continued in the cases of townships where the monuments of the original surveys were lost and where the owners of the lands had petitioned for the resurvey in accordance with the requirements of the Dominion Lands Surveys Act. Three surveyors, each accompanied by an assistant, were employed in travelling from place to place to correct when possible discrepancies in the original surveys where the extent of the work necessary did not call for a full survey party.

Township subdivision now extends into outlying districts well beyond settlement. Last season it was found possible to curtail such surveys to a considerable extent: only eighteen parties were employed under contract whereas during the previous season twenty-seven were occupied on similar surveys. The same careful inspection of surveys made under contract was carried out and invariably the work was found to have been done carefully and in conformity with the requirements.

The survey of the villa lot section of Banff, commenced in 1913, was continued, the surveys being made to conform with the designs of Mr. Thos. Mawson, town-planning expert. Various road location surveys were made and levels taken in the

vicinity of Banff, Field and Lake Louise. Canmore townsite was resurveyed and the Calgary-Banff auto road traversed for a distance of twenty miles.

Subdivision surveys in the railway belt, British Columbia, were continued on the same scale as formerly. The most valuable lands are disposed of by the department in parcels of forty acres or less; consequently, it is necessary to subdivide the townships much more completely than in the prairie provinces.

Mineral claim and timber berth surveys were made as required but this work has fallen off considerably in recent years.

The surveys in the Yukon territory, which are mostly in connection with the mining claims, were continued as usual under a director of surveys stationed at Dawson.

Following is the usual table showing the subdivision or settlement survey work completed each year since the inception of the surveys, with the result of last season's operations added:—

Period.	Acres.	Number of farms of 160 acres each.
Previous to June, 1873	4,792,292	29,952
1874	4,237,864	26,487
1875	665,000	4,156
1876	420,507	2,628
1877	231,691	1,448
1878	306,936	1,918
1879	1,130,482	7,066
1880	4,472,000	27,950
1881	8,147,000	50,919
1882	10,186,000	63,662
1883	27,234,000	170,212
1884	6,435,000	40,218
1885	391,680	2,448
1886	1,379,010	8,620
1887	643,710	4,023
1888	1,131,840	7,074
1889	516,968	3,231
1890	817,075	5,106
1891	76,560	476
1892	1,395,200	8,720
1893	2,928,640	18,304
1894	300,240	1,876
1895	406,240	2,539
1896	506,560	3,166
1897	428,640	2,679
1898	859,840	5,374
1899	1,022,720	6,392
1900 (first 6 months)	735,480	4,596
1900–1901	1,603,680	10,023
1901–1902	2,553,120	15,957
1902–1903	6,173,440	38,584
1903–1904	12,709,600	79,435
1904–1905	10,671,520	66,697
1905–1906	4,973,920	31,087
1906–1907 (9 months)	3,819,700	23,873
1907–1908	6,123,040	38,269
1908–1909	7,412,870	46,330
1909–1910	7,423,200	46,395
1910–1911	5,683,200	35,520
1911–1912	5,146,080	32,163
1912–1913	5,155,520	32,222
1913–1914	5,193,280	32,458
1914–1915	4,484,960	28,031
	170,926,305	1,068,284

THE DOMINION ASTRONOMICAL OBSERVATORY AND THE BOUNDARY AND GEODETIC SURVEYS.

It was mentioned in my last report that Little Saanich Hill, near Victoria, B.C., had been selected as the site for the branch Observatory, to contain the 72-in. reflecting telescope. Fifty acres of land, including the summit of this hill, have been purchased. The carriage road to the summit is under construction by the Provincial Government, and is almost completed. Plans and specifications for the building to contain the telescope have been prepared by the Department of Public Works.

It will be circular, 66 feet in diameter and 30 feet high, surmounted by a revolvable dome, of hemispherical form. Plans have also been prepared for an office building and dwelling houses for the observers. A well has been bored on the property and a pump installed to raise the water to the summit.

The glass disc for the large mirror of the telescope left Antwerp a few days before the war broke out, and in due time reached the J. A. Brasher Co., the contractors for the optical parts of the instrument. Good progress has since been made with the forming of the surface. The construction of the mounting for the telescope is well advanced. It is hoped that the completed telescope will be erected in its building before the end of the year.

The building on the Observatory grounds for the staff of the Boundary and Geodetic Surveys was completed in October, and the staff moved in, vacating the rooms formerly occupied in the Trafalgar Building and at No. 12 Kent Street. The new building is of fireproof construction, 73 by 40 feet, three stories in height, with an extension 25 by 24, of two stories. It affords much needed accommodations for draughting and computing, as well as for the administration of the various divisions of the field work.

Plans have been drawn for an eastern wing of the observatory building, one storey in height, with basement, matching in external appearance the existing western wing, which contains the transit instruments and the meridian circle. It is proposed to use the main floor of the new wing for the library, which is at the present in very cramped quarters—five thousand volumes in a room 21 by 13 feet. The basement will accommodate the machine shop, which is now in an inconveniently small building some distance away from the Observatory. It was considered inadvisable to proceed with this building during the present year.

The small building for the teleseopic camera, which is situated in front of the main building was completed in the month of May by the erection of its dome. The instrument was then installed, and has since been in active use.

The cellar mentioned in my last annual report, as under construction for the special instrument for measurement of earthtides, was completed in the spring of 1914. Considerable trouble has been experienced from water soaking through the walls in consequence of which the instrument has not yet been set up. It is thought however that the difficulty has now been overcome.

The seismographic instruments have been in constant operation during the year. The effieieney of the horizontal pendulums has been increased by replacing the hardened steel bearings by jewels. During the calendar year 1914, 76 distant earthquakes were recorded, besides the local one of February 10, 1914.

The systematic magnetie survey of Canada, which was initiated several years ago, has progressed satisfactorily. The three magnetic elements, declination, inclination and

intensity, were observed at 37 stations, the greater number of which were in a virgin field, along the line of the Transcontinental Railway. There is a large and growing public demand for the results of this survey, especially in regard to the declination.

The gravity survey completed its first season's work, 18 stations being occupied between Tadoussac and Windsor. The observations were taken with a half-second pendulum apparatus, of the Mendenhall pattern. By repeated observations at Washington, our observations have been linked up with the international series of gravity determinations.

The past year has been very favourable for Astrophysical observation, 906 stellar spectrograms having secured as against 531 in the previous year. Six orbits of binary systems have been completed and published, and additional observations of a seventh system have been secured which will strengthen the determination of its orbit. Two other orbits are practically complete, and considerable progress has been made with nine more. Some attention has been given to stars of the A and B spectrum types between 5·0 and 5·5 photographic magnitude, of which no observations are on record, in order to determine whether they are binary.

A statistical study of the motions of 167 stars whose radial velocities, proper motions and parallaxes are available, has been made.

A set of star maps to facilitate the observation of meteors has been prepared and published. These have since been adopted by the American Meteor Society.

Direct photographs of the sun (113 in number) were taken on all suitable days when spots were present. With the 23-ft. spectrograph 303 plates were made. Of these about 150 recorded simultaneously two sets of spectra of the limbs of the sun, one of the centre of the disc and two of iodine comparison spectra. The majority of these were taken at the Sun's equator. Plates of spot spectra (124 in number) were taken to record the penumbral convection for the gases producing certain lines. Each plate represents several separate exposures.

Some of these plates have been measured, though most of the time available for measurement has been spent on the solar rotation of the years 1911, 1912 and 1913, the measures of which have been completed.

The new telescopic camera, upon the completion of the building erected for it, was mounted and adjusted. The equipment consists of two doublets of 8-inch and 6-inch aperture and 40-inch and 30-inch focus respectively, a Zeiss lens of 3·3-inch aperture and 11·8-inch focus, a grinding telescope of 4·5-inch aperture and 52·5-inch focus, and two objective prisms of 15° and 25° to attach to the 8-in. doublet separately or together. The whole is mounted equatorially, with driving clock, and both hand and electric slow motions.

Observations with the meridian circle were made on 126 nights. On 101 nights the work was applied to the list of latitude stars which has been under observation for several years; there was approximately 2,000 observations for right ascension and 1,800 for declination. The time service has been maintained as in previous years. About 325 electrically driven clocks are operated in the Government's buildings by means of several master-clocks, continuously synchronized from the Observatory. In addition relays beating seconds are maintained in several offices in the city, time signals are sent out by telegraph and telephone, and a time-ball is dropped on Parliament Hill.

The astronomical field work comprised the determination of the latitudes and longitudes of nineteen stations. Of these, seven were in British Columbia. The longitude of Kamloops was just determined by telegraphic exchange of signals with Field, the longitude of which had been previously determined. Kamloops then was used as a base station for the other six.

Eight stations in Quebec, including four on the line of the Transcontinental railway, were determined, as to longitude, by telegraphic exchange with Ottawa.

At four more stations in Quebec, situated in the upper Ottawa River basin, the longitudes were determined by wireless telegraphy. The time signals sent out nightly by the United States wireless station at Arlington, Va., were utilized for the time comparisons. A portable receiving apparatus was furnished to the out-observer; another set was installed at the Observatory. The same signals being received at both points, direct comparisons of the times at Ottawa and at the distant station were secured. At each place the signals received were timed by the method of coincidences, using a break circuit chronometer, gaining about ten minutes a day to beat in the receiving telephones. In this way it is found possible to make comparisons within about one hundredth of a second. It is believed that the accuracy of longitudes thus determined is practically the same as of those determined by wire. The latitudes of these stations were also observed. The instrument used was a portable transit, fitted with registering micrometer and latitude level. This work was done for the Ottawa River Survey, Department of Public Works.

This is the first time that wireless telegraphy has been used in Canada in the determination of accurate geographical positions. The idea is not a new one; it has been applied practically in other countries; indeed, at the first invention of wireless telegraphy the great possibilities it opened for the reduction of the expense of surveys in remote districts were evident. Its use in any country is a question of transport of the apparatus, and the success of last year's operations is important, in demonstrating that transport by canoe or boat is practicable at small expense, and hence that the method can be advantageously applied in the whole of the vast northern regions of Canada.

The field work of the international boundary surveys has been completed, except on two sections of the boundary, namely, that between Lake Superior and Lake of the Woods (Article 5 of the Boundary Treaty of 1908), and that between the source of St. Croix river and St. Lawrence (Article 3). On the first of these sections the survey has been carried on for some years from both ends simultaneously. It has now reached, from the west, the eastern end of Lake Namakan, and, from the east, a point about 50 miles therefrom. Of the other unfinished section there remains the part lying along the so-called Highlands, between the State of Maine and the Eastern Townships of Quebec. Some additional triangulation is needed to complete the survey along the St. John and St. Francis rivers between New Brunswick and Maine.

Triangulation was carried on by the Geodetic Survey on the British Columbia coast and Queen Charlotte islands, south of Dixon's Entrance, this work being a continuation of the Boundary Survey triangulation in Alaska. Triangulation was also carried along the straits between Vancouver island and the mainland. A base line for this was measured near the mouth of Fraser river.

Triangulation was also carried on west of Lake Superior, and in the southwestern Peninsula of Ontario, along the St. Lawrence river below the city of Quebec, and along the Bay of Fundy.

Precise levelling was carried on by six parties, one of which operated in Nova Scotia, one in New Brunswick and Quebec, one in Ontario, two in Saskatchewan and Alberta, and one in Alberta and British Columbia. Connection was made with some of the tide guage stations of the Department of the Naval Service on the eastern seacoast, also with their guage at Vancouver.

It is proposed in the coming season to devote considerable attention to the strengthening of the net of levels extending westerly from the eastern coast, with a view to the establishment of a good sea level datum for central Canada.

FORESTRY.

During the year 1914-15 no additions were made to the forest reserves but further steps were taken for the organization of the reserves already established which aggregate 35,976 square miles in area, and very considerable advances were made in the equipment of the reserves with roads, trails, telephone lines and other means of preventing the destruction of the forests by fire. It is hoped that the continuance of this work for a few years will place the forest reserves in a condition that protection from fire may be reasonably assured. Owing to the financial stringency timber operations have been considerably curtailed, but a considerable improvement was made in such operations as were carried on in the disposal of debris resulting therefrom. The operators are beginning to realize that the disposal of the debris is not a burdensome matter and that it in some degree facilitates the handling of the timber, and there is a decidedly better observance of the requirements of the regulations in this respect. The disposal of debris of lumbering operations will do away with one of the most serious causes of the spread of fire.

The past year was very dry during almost the whole of the summer season, in fact it is the worst year in this respect that has been experienced since 1910. As a result a great many fires occurred, and although most of them were extinguished without difficulty a few fires which got beyond control on account of high winds, caused very considerable destruction of merchantable timber as well as of young growth. These recurring dry seasons test the fire preventive organization seriously and make it necessary that an organization should be developed that will meet the situation in the years of danger as well as in ordinary years.

The exploration of the forested districts that has been carried on during the past years was continued by a number of forest survey parties. These surveys are gradually accumulating a great deal of valuable information in regard to the forest resources of the western provinces, and are determining the lands which are non-agricultural and should be kept permanently for forest purposes. As a result of the information obtained through these surveys a number of additional forest reserves have been recommended.

In connection with the forestry work nothing is more gratifying than the continued and increasing interest taken by the farmers on the Western prairies in the planting of trees about their homes. The number of applications for trees during the past year was the largest that has yet been received, and the success of the plantations,

even through the dry season of the past year, shows that those receiving the trees are taking an active interest in making their plantations properly. The value of this work is seen in the more comfortable and homelike appearance of so many homes on the open prairie.

A new development in the work of the Forestry Branch was the establishment of the Forest Products Laboratories at Montreal in co-operation with McGill University. It has been felt that research work is very much needed for the development of the uses of the natural products of Canada and of industries dependent thereon, and that such work can best be carried on in co-operation with the educational institutions. As co-operation was offered by McGill University, together with the use of their testing laboratory and the expensive machinery contained therein, it was decided to establish the Laboratories in co-operation with McGill University. Co-operation with other universities is also carried on and arrangements are being made for joint research work with them. Tests of Douglas fir and of mining timbers from Nova Scotia have been carried on during the past year, and the results will be very valuable to the industries interested. Perhaps the most complete experimental equipment for investigations in the manufacture of pulp and paper from wood to be found any where has been installed, and it is expected that the results of the work carried on in this division will be of great value in the development of this, one of the greatest industries in Canada.

IRRIGATION.

A considerable impetus has been given to irrigation in the western provinces as a result of the severe drought that so seriously affected the crops in southern Alberta and southwestern Saskatchewan during the summer of 1914. In some districts the crop failure was almost complete, while in others only partially so, but even in the districts most severely affected by this almost unprecedented drought some good crops were harvested. Where irrigation water was available and properly used good crops resulted. Unfortunately irrigation water is not available over the greater portion of the drought affected area, but even where dry farming was practised some good crops were produced on summer fallowed land where good farming methods were followed. While such severe and widespread drought occurs but rarely, its occurrence twice within the last five years forcibly emphasizes the necessity for the construction of irrigation systems wherever the water supply is available. Even though the works may not be used every year the expenditure is justifiable as a form of crop insurance.

In addition to the usual work of stream measurement and the inspection of irrigation projects proposed, under construction, and licensed, a considerable amount of important survey work has been carried on by the engineers of the Irrigation Branch during the past year. One large irrigation project in the district immediately north of the city of Lethbridge was thoroughly surveyed, the canals and other works were located and the irrigable area approximately defined. Further surveys now under way will more accurately define the lands to be served by this proposed system and it is expected that by the end of the present season it will be possible to estimate the cost of the works within reasonable limits. This is in one of the districts severely affected by the drought of last year and the settlers are understood to be desirous of having an irrigation system constructed at the earliest posssible date and to be willing to defray the cost by bonds secured by a lien on the lands to be benefited.

Other important survey work was carried on in connection with the administration of the Waterways Treaty, under the provisions of which the waters of certain streams in southern Alberta and Saskatchewan are to be equally divided between Canada and the United States. These surveys were made for the dual purpose of defining the areas of land that can be irrigated in Canada from the waters of these streams and for the location and survey of reservoir sites in which Canada's share of the flood waters may be conserved. This work will be continued during the present year but it will probably be several years before it is finally completed.

The important work of stream measurement was continued as in former years and extended to include streams in the district north and west of Edmonton which had not previously been systematically measured because of their inaccessibility. The Grand Trunk Pacific and the Edmonton, Dunvegan and British Columbia railways are now sufficiently completed to afford ready access to much of this district, although the expense of establishing and maintaining stream gauging stations is still high in comparison with similar work in other districts. The record of the year's work will be published as usual.

THE DOMINION PARKS.

The year was one of active development in connection with the Dominion Parks although owing to the outbreak of war the number of visitors was not so large as usual. Special attention was given in all the parks to the perfecting of the fire and game protective orgaization and to the development of the system of roads and trails. In Rocky Mountains park 38 miles of new trails were constructed and five additional cabins for the use of the wardens built, making a total of 255 miles of trails and 14 cabins now in existence. A telephone system was inaugurated in both the Rocky Mountains and Jasper parks which will eventually be linked up with all the trails and cabins and add much to the efficiency of the fire protective system. A satisfactory diminution of fires was reported for the year, only one of any importance having occurred in any of the parks. The results of the game protection system are shown in the noticeable increase in wild life of all kinds. Deer, sheep and goats are particularly numerous and are becoming so tame that they are to be met with even within a few miles of the principal townsites.

Investigations were made during the year with regard to the question of antelope preservation and three areas were set apart for future reserves. Unless action is taken the extinction of this beautiful native animal would appear to be only a matter of a few years and efforts are being made to secure a herd large enough to prevent its complete disappearance from Canada.

Two important undertakings which were necessitated by the increased growth of the town were completed at Banff. These were the erection of the new bath house and the installation of the 20-inch steel water-main. Foundations for the bath house were laid during the previous year but the building itself was not commenced until April, 1914. The walls are of reinforced concrete faced with native blue limestone with numerous wide openings filled with plate glass. The swimming pool is the largest of its kind in Canada, 150 x 35 feet. It is lined with white porcelain brick and provision has been made for maintaining an ample supply of hot sulphur water at all seasons of the year. Dressing rooms capable of accommodating 132 persons have been built

along the south side of the pool and the roof above them forms a terrace from which visitors may have an excellent view of the bathers. The natural hot sulphur pool formerly known as the "Basin" was enlarged and a new entrance leading from the bathhouse also made to the "Cave."

The 20-inch steel water main was laid as an auxiliary to the existing 10-inch main which was no longer adequate for the needs of the town. A concrete intake with three sets of racks and screens was also constructed adjacent to the existing dam, provision being made for the future building of a concrete dam to replace the present loose-rock, crib-core dam.

The final two sections of the automobile road through the Rocky Mountains park were let during the summer and at the close of the season the road was completed as far as Castle and graded but not finally surfaced from Castle to the Divide at Vermilion pass. Considerable work was also done on repairs to existing roads in the parks and the road from Glacier to the Nakimu Caves was extended to within one mile of the Caves.

A tract of swamp land lying between the Cave and Basin road and the Bow river was reclaimed and converted into a recreation ground at Banff. In addition to providing excellent grounds for sports the draining of this land resulted in practically putting an end to the musquito pest which had formerly been a drawback to the erection of houses on the Cave and Basin avenue.

At Buffalo park the Government herd of pure blood bison continues to do well and now numbers 1,640 head, an increase of 202 during the year. All the animals appear to be in excellent condition. No disease of any kind was reported for the year.

The Park farm was again operated and produced 14,000 bushels of feed oats, 4,000 bushels more than were required for its own needs. The surplus was accordingly shipped to the other parks where it was delivered and stored at a cost considerably less than the oats could have been purchased for elsewhere.

At Elk Island park it was also possible to effect a saving in the cost of feed by having the supply of hay put up by the park staff instead of purchasing it by contract as in former years. Two hundred tons were thus secured at a price considerably lower than the market quotation.

The area of Waterton Lakes park was extended so as to include an important big game area to the north and to adjoin the United States Glacier National park to the south thus establishing practically an international game preserve, a step which had been advocated by authorities interested in game protection for many years.

The boundaries of Jasper park were also extended and made to include the Brazeau country to the south, a well known scenic and big game district. Jasper is now the largest of the parks and with two transcontinental railroads traversing it, it should become before many years, an unequalled resort for tourists. Much development work was also done in this park in connection with the building of roads and trails so as to bring its most important scenic points within convenient reach of the tourist.

A new park was established near Revelstoke, B.C., taking in the summit of mount Revelstoke and part of the Clach-na-Coodin group of mountains. This district possesses striking scenic attractions but is unfitted for agriculture or other purposes.

An automobile road is under construction from Revelstoke to the summit and when completed a new Alpine area unsurpassed in attractions will be opened up to Canadians and visitors from other countries.

WATER-POWERS.

The last fiscal year has been one of steady substantial development in the work of the Dominion Water Power Branch. Several distinguished visitors from foreign countries have spent some time with the officers of this Branch investigating our methods of water power administration and investigation. Mr. Von Weymarn, a representative of the Imperial Government of Russia, spent several weeks in the head office of the Branch in Ottawa, and also visited some of the offices in the west. Other foreign visitors included Mr. A. Berggren, Superintendent of Government Power Stations, Sweden, and Mr. Richard Smedburg of the Hydrographic Bureau, Sweden.

At the request of the Secretary of the Department of the Interior, United States Government, the Superintendent of the Branch spent some time in Washington conferring with the officers of the United States Department of the Interior in connection with water power administration problems in United States territory.

The Branch has co-operated extensively with the Commission of Conservation, the Provincial Department of Lands of the Province of British Columbia, and also with the Nova Scotia Water Powers Commission. Arrangements have been perfected for active co-operation with the Nova Scotia Water Powers Commission in an investigation of the water-power resources of that province.

A very considerable portion of the time of the officers of the Branch has been occupied with important problems before the International Joint Commission in connection with the Lake of the Woods Reference, which is of vital importance to the developed and undeveloped powers of the Winnipeg river in the Province of Manitoba. No expense or effort is being spared to present the best possible case to the International Joint Commission when this Reference is finally determined. Owing to the enlistment for foreign service of Mr. R. M. Dennistoun, K.C., special counsel engaged by the Branch in connection with this matter, the services of Mr. Edward Anderson, K.C., of Winnipeg have been retained. Under Mr. Anderson's direction, and with the co-operation of the Superintendent of the Branch, counsel representing the various power interests on the Winnipeg river have been retained and are preparing a case for these power interests.

In connection with this important matter the Superintendent of the Branch has represented the Department on the inter-Departmental board known as the Lake of the Woods Technical Board, and has also acted as Secretary. Under the direction of this Board a staff of highly qualified engineers has been engaged for some months in collating all pertinent data for use in the preparation of a memorandum to the Canadian Government covering all the various Canadian interests involved in this reference. The engineers of the Dominion Water Power Branch have been in close co-operation with these engineers in this matter.

The proposal covering a water power exhibit to show the tremendous water power resources of Canada has been successfully worked out, and a very creditable exibit has been completed and installed in the Canadian Pavilion at the Panama-Pacific Inter-

national Exposition. This exhibit will be used as the basis of an active propaganda throughout the term of the Exposition on behalf of the Dominion Water Power Branch to disseminate information regarding the developed and undeveloped water powers throughout the Dominion. A special effort has been made to have Canada's power resources brought to the attention of the International Engineering Congress which will be held in connection with the Exposition in September. Prominent engineers eminent in water-power practice throughout the Dominion have consented to be present and take part in a discussion on two papers prepared at the request of the Superintendent by Mr. C. H. Mitchell, Consulting Engineer of Toronto. These papers will form a part of the formal proceedings of the Congress.

Arrangements have also been made for the preparation of the following five monographs on the water powers of Canada covering the power situation of provinces of Canada, by eminent engineers:—

(1) Water Powers of British Columbia, by G. R. G. Conway, Consulting Engineer, Vancouver, B.C.

(2) Water Powers of the Prairie Provinces, by P. H. Mitchell, Consulting Engineer, Toronto.

(3) Water Powers of Ontario, by H. G. Acres, Hydraulic Engineer, Ontario Hydro-Electric Power Commission, Toronto.

(4) Water Powers of Quebec, by F. T. Kaelin, Shawinigan Water and Power Company, Montreal, Que.

(5) Water Powers of the Maritime Provinces, by K. H. Smith, Engineer, Nova Scotia Water Powers Commission, Halifax, N.S.

While actual construction operations have not been commenced on any new power projects during this fiscal year, preparations are under way for the commencement at an early date of several very important developments in various parts of the west. Unless the financial stringency due to the disturbed conditions in Europe prevents the financing of these schemes they will be well under way during the next fiscal year.

While the financial stringency already referred to may cause some delay in the commencement of new power projects, it may be considered to be fortunate in so far as water powers in the west are concerned, in that it allows the Dominion Water Power Branch an opportunity of proving or disproving beyond doubt, the economic features of important power projects throughout the west, which, owing to their strategic location close to existing commercial centres have attracted the promoter and the capitalist and caused them to expend considerable money in endeavouring to work out a method of development which could be approved under the strict practice of the department.

Continuous hydrographic studies for a period of several years are essential to the final determination of the economic features of power projects, and it is very satisfactory indeed to know that the important rivers of the provinces of Manitoba, Saskatchewan, Alberta and British Columbia, are now included in the hydrographic work of the department. While the past fiscal year and probably the next may not witness the commencement of many new power projects they should offer the depart-

ment an opportunity of securing the essential hydrographic data referred to, and thus insure the commencement of projects in due time whose economic features will be beyond peradventure.

Very satisfactory progress has been made in all the field work of the Branch carried on under the direction of the Hydraulic Engineer, Mr. J. T. Johnston. A full report on the power and storage investigations of the Bow river by Mr. M. C. Hendry has been published and extensively distributed. This report forms a notable addition to the information respecting water power resources of Canada, and should prove invaluable to the Department in working out an efficient and effective administration of the important water powers of the Bow river which already forms such an important factor in the commercial and industrial development of the city of Calgary. A full report by Mr. J. T. Johnston on the elaborate investigations which have been carried on for a number of years covering the power and storage possibilities of the Winnipeg river in Manitoba is practically complete and ready for publication. This work will also prove an important factor in the development and administration of the water powers of the Winnipeg river in Manitoba. It will be shown that the city of Winnipeg, on the eastern threshold of the Prairie Provinces, is within easy transmission radius of a dependable potential power source of nearly half a million horse-power.

Following the transfer of the administrative control of the water in the Railway Belt to the province of British Columbia, many matters respecting both water and land administration in the Dominion Railway Belt have arisen between this department and the provincial Department of Lands. Every effort is being made to have a satisfactory adjustment of these matters. In this connection the services of Mr. H. W. Grunsky who acted as legal advisor to the province of British Columbia for several years in connection with water matters, have been retained by this department. Mr. Grunsky's expert advice will not only be available in connection with these matters, but also in advising and assisting the department in perfecting the water power administration in the provinces of Manitoba, Saskatchewan and Alberta.

The following members of the staff of the Dominion Water Power Branch are with the Canadian Expeditionary Forces:—

Lieutenant-Colonel C. H. Mitchell, Consulting Engineer to the Branch.

Head Office—

H. L. Mainguy.
H. L. Mahaffy.

Manitoba Hydrographic Survey—

P. J. Barry.
E. B. Chalmers,
A. P. Smith.

British Columbia Hydrographic Survey—

C. P. Cotton.
D. O'B. Gill.

SCHOOL LANDS.

In consequence of the partial failure of the crop last season and the prevailing financial stringency no general auction sales were held during the fiscal year.

The total revenue from School Lands in the three provinces was $932,570.65 as against $1,207,015.23 last year, a decrease of $274,444.58. This is due to the fact that no auction sales were held in consequence of the financial conditions.

The revenue from the different sources was as follows:—

Sales	$758,559 19
Grazing	48,057 49
Coal	8,829 69
Hay	7,849 62
Petroleum and gas	104,568 00
Cultivation permits	299 52
Timber	3,809 64

The amounts paid over to the Governments of the provinces of Manitoba, Saskatchewan and Alberta of the revenue collected during the fiscal year, less the principal moneys of sales and less also the expenditure, was as follows:—

Manitoba	$ 60,502 64
Saskatchewan	148,933 52
Alberta	182,477 81

In addition to this the interest on the School Lands Funds for the past fiscal year was paid over by the Finance Department to the Government of each of the provinces, the amounts being as follows:—

Manitoba	$109,061 65
Saskatchewan	91,051 42
Alberta	76,435 88

This makes the total sum paid to each province as follows:—

Manitoba	$169,564 29
Saskatchewan	239,984 94
Alberta	258,913 69

The statements attached to the report of the Controller of the School Lands Branch show the balance standing to the credit of each fund on the 1st of April, 1915, to be as follows:—

Manitoba	$3,686,966 91
Saskatchewan	3,063,063 02
Alberta	2,520,596 80

MINING LANDS.

During the year prospecting and mining in the Western Provinces and Territories have shown a very pronounced increase of activity. The revenue from mining lands is derived entirely from fees, rental and royalty, and owing to the conditions resulting from the war extensions of time in many cases have been granted within which to make payment, especially in respect of those persons who have been accepted for service in the defence of the Empire.

The revenue derived from mining lands during the year amounted to $1,604,215.60, an increase of $719,554.36 over the previous year, or more than 80 per cent.

Owing to the discovery of high-grade petroleum, in what would appear to be paying quantity, in section 6, township 20, range 2 west of the 5th meridian, the activity in prospecting for petroleum and natural gas was very materially stimulated and has resulted in the discovery at different points of large quantities of natural gas, which is being used for domestic and commercial purposes, as well as petroleum in considerable quantity. A great many wells are now in process of boring, some thirty of which have reached a depth of more than 2,000 feet.

A very important discovery of nickel silver has been reported near Fond du Lac at the eastern end of Lake Athabaska, in the province of Saskatchewan. Communica-

tion by means of light draught steamers has been established with the point of discovery, and it is confidently expected that further development, now made possible by new means of communication, will disclose a large body of ore of commercial value.

The gold production of the Yukon Territory during the year was $4,649,643.40. This is a slight decrease in output as compared with the previous year and is accounted for by the shortening of the operating season last autumn. This gold is produced chiefly by hydraulic and dredging operations conducted by companies operating large plants and controlling considerable areas, some of which are being mined for the second time.

Coal mining operations are being vigorously carried on in Alberta and southern Saskatchewan, while in the Yukon Territory a sufficient quantity of coal is being mined to satisfy the local demand.

TIMBER.

The total area held under license in Manitoba, Alberta, Saskatchewan and British Columbia was 7,272·93 square miles, and under permit the area was 809·29 square miles.

The operations conducted on the berth held under license were as follows:—

Sawn lumber	173,203,615 ft. b.m.
Shingles	208,750 "
Railway ties	144,745 "
Laths	21,956,679 "

Operations conducted on berths held under permit, exclusive of cordwood berths, were as follows:—

Sawn lumber	26,255,288 ft. b.m.
Laths	2,073,000 "
Shingles	2,869,000 "

This is a large decrease compared with the operations conducted during the fiscal year 1913-1914, owing to very depressed condition of the lumber market.

The revenue derived from timber cut on Dominion Lands amounted to $271,418.72, which is somewhat less than the revenue from timber during the last fiscal year, owing to the general depression which necessitated the granting of extensions of time to pay moneys already due. Some of these liabilities have already been liquidated, while others will likely be reduced within the next few months.

GRAZING.

There were 2,457 grazing leases in existence on March 31, 1915, covering a total area of 4,853,555 acres, being an increase of 372,753 acres as compared with the previous year.

During the year 541 new grazing leases were issued.

The revenue derived from rentals on grazing leaseholds amounted to $95,229.99, being an increase of $10,351.73, over the previous year.

The receipts from hay leases and permits amounted to $7,522.79, which is slightly less than the receipts for last year.

I have the honour to be sir,

Your obedient servant,

W. W. CORY,

Deputy Minister of the Interior.

PART I

DOMINION LANDS

DOMINION LANDS.

No. 1.

REPORT OF THE COMMISSIONER.

W. W. Cory, Esq., C.M.G.,
Deputy Minister of the Interior,
Ottawa.

Ottawa, Ont., June 16, 1915.

Sir,—I beg to submit my report for the twelve months ending March 31, 1915, on the Dominion Lands Branch of this department, together with the report of the Chief Inspector of Dominion Lands Agencies, the reports of the Inspectors of Dominion Lands Agencies, and the agents of Dominion Lands for the several districts.

The following summary has been prepared of the work transacted in the Dominion Lands Branch during the period mentioned, as compared with the corresponding twelve months of the previous year:—

	1914.	1915.
Number of files dealt with	223,855	197,148
Letters written	178,242	190,727
Triplicates	108,522	97,672
Total letters	286,764	288,399
Applications for Patent—		
Number examined	53,083	46,197
New applications	30,437	21,039
Applications accepted and notifications sent out	28,513	21,802

I have the honour to be, sir,

Your obedient servant,

J. W. GREENWAY,
Commissioner of Dominion Lands.

No. 2.

REPORT OF THE CHIEF INSPECTOR OF DOMINION LANDS AGENCIES.

I beg to submit my report for the twelve months ending March 31, 1915.

In the month of November last, I received the appointment of Chief Inspector of Dominion Lands Agencies for the four provinces: Manitoba, Saskatchewan, Alberta, and British Columbia, Mr. Oliver Neff being appointed to take my place in Brandon as Inspector of Dominion Lands Agencies for the province of Manitoba and Saskatchewan, so I shall confine myself to making a few general remarks, as you will no doubt receive, in due course, from Inspectors J. W. Martin and O. Neff detailed accounts of the work done throughout the provinces under their jurisdiction during the past year.

I have been instructed to make many investigations throughout the year, and held several under oath, as well as a number of ordinary investigations. Since assuming office in Minnedosa I have held eleven investigations under oath and twenty-one ordinary investigations, but, previous to that, I am unable to give the number made, as the information would be on record in the Brandon office.

I have visited all the offices in Manitoba, Saskatchewan, and Alberta during the past year, and found everything very satisfactory.

I regret to report that last year a large section of the southern portion of Saskatchewan and Alberta were complete crop failures owing to drought, and this necessitated a good many homesteaders having to leave their land in order to seek employment, and it was also necessary for the Immigration Department to furnish relief and seed grain to these settlers for the coming year.

I placed nearly all the homestead inspectors of the three provinces: Manitoba, Saskatchewan and Alberta, also a number of the sub-agents at the disposal of Mr. Bruce Walker, the Commissioner of Immigration, to assist in the distribution of seed grain. Through the homestead inspectors having to devote their time to this work, the inspection work of the department has got considerably behind, but no doubt the inspectors will soon be relieved of their duties in connection with seed grain and be able to resume their duties, when I hope to have all arrears of inspection work brought up to date.

The spring is opening under very favourable conditions, the weather, so far, having been unusually warm, and the prospects look bright for the coming year.

My office staff, at present, consists of the following:—Miss G. A. Fairbairn, clerk and stenographer; Miss E. Wright, relieving stenographer; Mr. F. S. Szblewski, chief homestead inspector, has also been attached to my office in Minnedosa, and has held several investigations amongst the foreign element.

H. G. CUTTLE,
Chief Inspector of Dominion Lands Agencies.

No. 3.

REPORT OF THE INSPECTOR OF DOMINION LANDS AGENCIES, BRANDON, MANITOBA.

Attached hereto you will find statements of the work performed by the Dominion Lands Agencies, Dominion Lands Sub-Agencies, and Homestead Inspectors.

My duties as inspector having only been for a portion of the year, viz., since November 23, 1914, I have not been able to visit all the agencies. In all cases where inspections have been made the agents and staff are satisfactory, and the business seems to be well conducted.

My assistant, Mr. Bronsdon, has inspected all the sub-agencies, each within the year, and in some cases twice, and in others three times, and made his reports.

A number of matters have been referred to me for investigation, a portion of which have been dealt with and reported upon.

The staff in this office consists of Mr. T. Bronsdon, assistant, and Miss K. Cornell, stenographer; both of whom are well qualified, and perform the duties assigned them very efficiently.

From the best sources of information at my disposal I am pleased to be able to state that the farmers in Manitoba and Saskatchewan have had a fair return for their labours, with the exception of those located in Maple Creek and Swift Current agencies, where, owing to the lack of moisture, there was almost a total failure of the crop, which resulted in a large number being unable to provide food for themselves, food for the stock, and seed for the present year. Owing to the timely aid by the Government of provisions, fuel, and feed for stock, there was little, if any, suffering, and having supplied seed grain has resulted in a very large area being sown this spring, and I am informed that the land was well prepared and crop prospects are excellent.

There was failure, or partial failure, of the crops in other parts of the two provinces, where assistance was given by providing seed grain.

The area seeded this season is very much in excess of that of past years.

There has been a great increase in live stock during the last year, mixed farming being now general.

The provision by the Department of Agriculture to supply entire pure-bred animals has been the means in a great measure of raising the standard of stock and help to the farmers.

Notwithstanding the financial depressions and the effect of the war on all classes of business, the prospects for this year are good.

There are fourteen agencies, forty-two sub-agencies, and forty-one homestead inspectors in the provinces of Manitoba and Saskatchewan.

O. NEFF.
Inspector of Dominion Lands Agencies.

DOMINION LAND AGENCIES.—Manitoba and Saskatchewan—Principal Transactions for the Departmental Year ending March 31, 1915.

Agencies.	Homestead entries granted.	Land Sales.			S. A. Script.	Applications for Patent received.	Land Entries cancelled.	Timber permits issued.	Hay permits issued.	Letters.		Revenue.	No. of Staff.	Expenditure.	
		Ordinary and School Lands.	Pre-emptions.	Purchased Homesteads.						Received	Sent.			Salaries.	Disbursements.
												$ cts.		$ cts.	$ cts.
Battleford	1,243	55	49	17	.....	1,227	918	707	350	27,946	32,457	52,465,07	9	9,797 21	1,033 90
Brandon	48	16	.....	.....	.....	25	26	2	147	3,911	3,908	4,849 74	3	3,179 96	154 74
Dauphin	1,313	14	.....	.....	.....	523	536	501	296	32,714	24,452	32,923 76	9½	8,999 92	831 25
Estevan	50	2	1	1	.....	64	24	.....	76	3,714	1,936	9,608 97	3½	3,424 93	221 15
Humboldt	768	27	.....	.....	.....	776	513	179	292	18,887	24,301	15,147 55	8½	7,293 24	1,032 50
Maple Creek	990	21	633	48	.....	1,924	654	687	402	45,756	41,290	123,784 59	14½	12,283 42	1,101 97
Moosejaw	1,183	30	621	35	.....	2,603	1,000	146	477	34,735	31,812	114,759 17	15	12,937 72	1,298 00
Prince Albert	1,567	67	1	3	.....	908	678	1,230	358	34,081	38,823	80,977 88	15½	12,847 64	2,004 61
Regina	131	15	.....	.....	.....	185	69	6	261	7,098	7,304	9,923 99	4½	4,459 92	337 44
Saskatoon	816	41	181	73	.....	2,157	823	117	427	36,999	43,044	116,007 24	16½	17,513 12	2,074 78
Swift Current	731	22	426	43	.....	2,301	615	206	460	25,064	31,107	97,238 56	16½	14,836 28	2,011 66
Weyburn	445	7	203	15	.....	610	371	10	227	9,675	6,152	64,007 77	5½	5,214 96	408 00
Winnipeg	3,059	61	.....	1	.....	583	1,090	2,174	1,055	36,289	43,023	122,617 05	15	17,144 79	1,452 77
Yorkton	866	25	.....	.....	.....	807	307	204	162	14,833	17,450	14,593 72	6	2,061 06	507 40
Total for year 1914–15	13,210	403	2,115	236	.....	14,693	7,624	6,169	4,990	331,702	347,059	858,905 06	138	131,994 17	14,470 17
1913–14	17,581	581	4,498	534	28	19,581	12,079	7,596	4,565	351,861	373,329	1,326,260 20	154	147,978 06	15,801 30
1912–13	18,908	676	4,754	671	77	15,680	11,090	7,434	4,830	328,299	349,779	1,442,790 55	142	126,442 90	16,068 30

DOMINION LAND SUB-AGENCIES.—Manitoba and Saskatchewan—Work Performed during the Departmental Year ending March 31, 1915.

Name.	Sub-Agency.	Applications for Homesteads.	Applications for Purchased Homesteads.	Applications for Preemptions.	Applications for Patent.	Applications for Inspection.	Applications for Timber Permits.	Applications for Hay Permits.	Amounts remitted to Land Offices.	Expenditure.		Remarks.
										Salary.	Postage and Commissions.	
									$ cts.	$ cts.	$ cts.	
S. E. Spicer	Alsask	30	1	14	29	18	2	.....	660 50	600 00	10 40	
S. Fjelstead	Arborg	99	.....	.....	50	59	2	2	1,901 80	300 00	9 33	
T. H. Rose	Assiniboia	272	7	191	411	135	24	28	7,392 33	480 00	40 00	
J. K. Richmond	Biggar	73	4	14	144	61	.....	11	2,217 15	525 00	16 24	Closed Feb. 15, 1915.
Jos. Roberts	Blaine Lake	161	2	.....	135	67	104	49	1,981 81	550 00	18 52	
J. W. Simpson	Canora	214	.....	.....	122	66	23	8	2,682 65	900 00	26 92	
A. J. Robertson	Davidson	34	1	.....	79	38	.....	3	802 00	480 00	14 26	
W. A. Urton	Duck Lake	46	.....	.....	76	30	21	4	486 15	480 00	6 32	
T. J. McGregor	Edam	216	.....	.....	306	85	20	14	2,415 80	580 00	18 08	
Wm. Banks	Gull Lake	118	8	75	545	99	1	60	4,095 30	900 00	42 67	
G. Gregg	Hanley	54	4	6	41	48	25	3	1,413 05	600 00	19 68	
M. H. Klassen	Herbert	77	3	20	513	74	99	70	2,592 33	725 00	61 38	
Aaron Read	Kerrobert	140	12	45	508	138	.....	12	4,823 95	600 00	41 29	
G. G. Blackstock	Kindersley	89	19	16	727	126	.....	17	5,385 60	600 00	69 35	Le Pas.
C. H. Anderson	Le Pas	4	.....	.....	.....	.....	20	3	4,432 55	900 00	33 37	Mining claims 664.
W. L. Craddock	Lanigan	57	.....	.....	93	30	.....	2	990 40	420 00	13 17	Powers of Attorney 160.
R. Newth	Lipton	10	.....	.....	24	5	2	7	141 45	480 00	5 64	
W. H. Holland	Lloydminster	106	1	.....	147	37	15	14	1,721 09	600 00	23 37	
E. M. Reid	Macklin	27	4	7	137	26	55	4	1,446 50	500 00	9 58	Closed Sept. and Oct, 1914.
J. Hodges	Makinak	76	.....	.....	11	33	40	25	866 15	600 00	13 55	
J. W. Young	Melfort	293	.....	.....	221	116	70	28	3,256 55	900 00	32 04	
J. R. Chisholm	N. Battleford	410	.....	1	215	162	114	34	5,822 88	600 00	39 18	
J. J. McGurran	Nokomis	12	.....	3	25	17	.....	11	311 60	300 00	4 37	.....
A. Libiron	Ponteix	212	3	148	583	165	.....	36	5,214 00	505 00	42 09	
R. S. Dundas	Pelly	93	.....	.....	59	26	84	7	1,154 55	600 00	23 90	
S. Arnason	Piney	41	.....	.....	43	21	29	9	557 30	300 00	5 96	
E. J. Medland	Punnichy	76	.....	.....	65	44	.....	9	961 80	300 00	15 35	
D. McMurphy	Preceville	94	.....	.....	109	49	36	11	1,280 65	600 00	12 11	
V. W. Johnston	Rossburn	15	.....	.....	6	12	20	11	244 60	600 00	2 97	
E. St. G. Hodson	Rosthern	49	.....	1	48	24	11	11	612 06	600 00	13 95	

DOMINION LAND SUB-AGENCIES.—Manitoba and Saskatchewan—Work performed during the Departmental Year ending March 31, 1915—*Concluded.*

Name.	Sub-Agency.	Applications for Homesteads.	Applications for Purchased Homesteads.	Applications for Preemptions.	Applications for Patent.	Applications for Inspection.	Applications for Timber Permits.	Applications for Hay Permits.	Amounts remitted to Land Offices.	Expenditure.		Remarks.
										Salary.	Postage and Commissions.	
									$ cts.	$ cts.	$ cts.	
W. W. Spencer	Shelho	59	.....	.....	123	31	1	2	739 75	300 00	9,56	
J. E. Canham	Sprague	37	.....	.....	4	15	7	.....	374 75	300 00	5 87	
J. W. Hanger	Shellbrooke	196	.....	.....	148	102	174	24	2,488 35	600 00	37 54	
Chas. Jacobs	St. Rose du Lac	309	.....	.....	81	48	88	35	3,466 50	360 00	23 90	
J. Probinzanski	Stuartburn	36	.....	.....	.....	1	23	9	393 26	120 00	6 29	
F. Serase	Swan River	143	.....	.....	44	46	42	15	2,764 10	480 00	36 19	Tisdale.
	Tisdale	217	.....	.....	143	79	36	11	2,382 55	600 00	16 70	S. P. Grant, April to December.
S. Humphrey	Unity	101	4	23	202	72	100	13	3,046 65	600 00	25 58	W. Morrow acting Jan. and Feb.
J. Kulaczkowski	Vita	53	.....	.....	19	6	55	28	1,126 80	180 00	10 98	W. Buxton appointed March.
J. Cleve Hearn	Wadena	178	.....	.....	195	78	13	6	2,111 55	780 00	29 28	
J. J. Gunn	Wilkie	37	4	3	99	36	28	7	2,127 20	600 00	19 15	
P. Lapoinre	Willowbunch	199	7	100	427	112	42	41	4,745 50	720 00	19 86	
S. Lytwyn	Winnipegosis	60	.....	.....	27	11	26	18	520 30	300 00	11 68	
T. N. Rowe	Wynyard	70	.....	.....	88	50	.....	12	901 80	600 00	13 70	
A. S. Roth	Watrous	67	.....	.....	50	29	.....	6	1,658 65	245 00	9 26	Closed Oct. 8, 1914.
J. D. Murdock	Zealandia	55	7	17	239	79	.....	8	2,887 20	900 00	27 92	Leave of absence Jan., Feb. and March.
Totals		5,015	91	684	7,361	2,506	1,452	738	99,599 46	24,810 00	989 34	
Compared with 1913–14		6,578	204	1,164	9,899	3,900	1,753	1,177	136,314 75	23,792 75	1,280 99	
Compared with 1912–13		.....	9,123	.....	8,757	4,444	1,879	1,286	171,746 39	19,495 38	1,376 97	

STATEMENT showing Principal Work performed by Homestead Inspectors in Manitoba and Saskatchewan for Departmental Year ending March 31, 1915.

Name.	Headquarters.	Land Inspections made.	Applications for Patent made.	Miles Travelled.		Travelling expenses for self and team.	Salaries.	Remarks.
				Wagon.	Rail.			
						$ cts.	$ cts.	
Anderson, D.	Battleford	189	117	5,878	64	1,066 65	1,300 00	
Dewar, A C.	"	179	45	4,757	785	1,073 60	1,300 00	
Elliott, A C.	"	167	86	4,828	2,425	892 53	1,300 00	
Douglas, A C.	Brandon	101	34	1,793	3,360	514 30	1,500 00	On Seed Grain distribution February and March.
Speers, Geo. L.	Dauphin	402	83	5,950	2,107	1,080 90	1,500 00	On seed Grain distribution March 1–23.
Martin, Thos. C.	"	79	94	3,377	4,375	1,118 23	1,200 00	
Secord, Thos. C.	"	284	17	4,427	1,543	1,089 95	1,200 00	
McGowan, G.	"	230	106	3,574	3,083	949 00	1,300 00	On seed grain distribution February and March.
Morrison, W.	Estevan	244	38	2,706	13687	1,147 37	1,200 00	At Calgary November, on seed grain distribution March..
Smyth, Arthur.	Humboldt	332	47	6,360	2,262	1,115 00	1,200 00	On seed grain distribution from January 26.
McKay, R G.	"	61	7	1,414	1,456	356 01	433 32	April to July—resigned.
Roth, A L.	"	109	18	2,804	1,570	568 40	600 00	October to March, on seed grain distribution March.
Jones, W S.	Maple Creek	180	185	5,350	914	1,156 15	1,200 00	On seed grain distribution March 15–31.
McLaren, Peter.	"	167	439	4,595	1,737	1,176 07	1,200 00	On seed grain distribution March 13–31.
Steer, W.	"	125	298	3,525	0	913 42	1,200 00	
Erratt, W H.	Moosejaw	210	184	4,010	568	1,071 33	1,200 00	On seed grain distribution March.
Brandt, P. B.	"	221	66	3,392	4,191	1,136 45	1,200 00	On seed grain distribution March.
Rathwell, J G.	"	198	92	2,909	1,753	1,043 90	1,200 00	On seed grain distribution from February 20.
Mines, J.	"	172	166	1,444	449	356 95	400 00	Resigned July 31, 1914.
Monckton, W. J.	"	110	59	2,443	2,065	696 65	1,000 00	Commenced duties August 1, 1914.
Bigg, F J.	Prince Albert	217	22	4,139	2,876	903 30	1,200 00	On seed grain distribution March.
Sutherland, T L.	"	318	0	6,105	0	1,257 70	1,200 00	Sick October, on seed grain distribution February and March.

STATEMENT showing Principal Work performed by Homestead Inspectors in Manitoba and Saskatchewan for Departmental Year ending Mareh 31, 1915.—*Concluded.*

Name.	Headquarters.	Laad Inspections made.	Applications for Patent made.	Miles Travelled.		Travelling expenses for self and team.	Salaries.	Remarks.
				Wagon.	Rail.			
						$ cts.	$ cts.	
Boucher, J B	Prince Albert	228	2	5,549	1,008	1,287 30	1,200 00	
Mackenze, J F	"	237	6	5,542	1,375	1,116 55	1,200 00	On seed grain distribution February and March.
Ouellette, C. J	Regina	88	40	2,196	7,310	923 09	1,300 00	On seed grain distribution March.
Dickson, R H	"	55	26	1,224	4,413	539 73	1,200 00	On seed grain distribution March.
Collins, F M	Saskatoon	165	106	4,637	2,849	1,484 45	1,200 00	On seed grain distribution March 15 to 31.
Balfour, J A	"	212	75	3,721	5,972	1,514 43	1,500 00	
Mosses, A E	"	192	106	4,653	3,024	1,450 50	1,200 00	On seed grain distribution March.
Barr, C E	"	92	19	3,424	2,822	1,199 05	1,200 00	On holidays in December.
Shields, Wm	Swift Current	218	204	5,933	236	1,305 40	1,224 99	On seed grain distribution February and March.
McDonald, J A	"	206	106	5,258	162	1,313 85	1,200 00	On seed grain distribution March, leave of absence.
Furnis, J	"	165	138	3,845	560	1,021 35	1,200 00	On seed grain distribution March (January 11-31).
Lepine, L	Winnipeg	384	37	3,082	3,132	1,365 73	1,200 00	
Gillespie, W D	"	504	49	4,206	2,020	954 95	1,200 00	
Lagimodiere, Wm	"	559	81	4,258	2,774	1,282 05	1,500 00	
Reykdal, Paul	"	723	181	6,253	3,504	1,111 45	1,300 00	
Oughton, Mat	"	119	9	1,982	880	308 50	700 00	Appointed September 1st, 1914.
Dickins, Geo	Weyburn	2	860	394	17,383	1,144 75	1,200 00	
Hober, E. J	"	172	268	5,635	2,623	1,233 80	1,200 00	On seed grain distribution March.
Henke, A. E	Yorkton	258	33	4,349	1,314	1,037 60	1,200 00	On seed grain distribution March.
Balhinard, J. C. De	"	96	43	1,732	1,042	390 60	500 00	Left Aug. 31 to go to Front.
Parker, R. J. M	"	203	159	4,009	2,205	1,146 20	1,200 00	On seed grain distribution March.
Totals		9,173	4,751	167,632	117,878	43,815 19	49,858 31	
Compared with 1913-14		8,221	3,755	166,373	229,438	43,472 12	48,854 99	
Compared with 1912-13		8,043	3,177	142,194	127,345	38,929 58	43,735 16	

No. 4.

REPORT OF INSPECTOR OF DOMINION LAND AGENCIES.

CALGARY, ALTA., May 29, 1915.

SIR,—I have the honour to submit herein my annual report for the fiscal year ending the 31st March last.

I am attaching hereto three schedules A, B, and C, showing the principal transactions of the different land agencies in Alberta and British Columbia, those of the sub-agencies and those of the homestead inspectors in the same territory.

From schedule A you will observe that in some branches of the business the volume of work has decreased, while others have increased. The general work of the agencies has increased, as has also the revenue, over that of the year ending March 31, 1914. The increase in revenue would have been greater had payments in connection with pre-emptions and purchased homesteads been insisted upon, which of course was not the policy of the department on account of financial conditions.

I might add, in conclusion, that the general work of our officials in my territory has been carried on in an efficient manner, and the officials deserve credit for the satisfactory discharge of their duties, and the interest taken in departmental matters.

Your obedient servant,

J. W. MARTIN,
Inspector.

A.—Statement of Principal Business Transactions at Dominion Land Agencies in Alberta and British Columbia, Year ending March 31, 1915.

Agency.	Homestead entries.	Land Sales.			Application for patent.	Land entries cancelled.	Timber permits issued.	Hay permits issued.	Letters.		Revenue.	No. of staff.	Expenditure.	
		Ordinary.	Pre-emptions.	Purchased H'stds.					Received	Written.			Salaries.	Disbursements.
											$ cts.		$ cts.	$ cts.
Calgary	994	46	400	53	3,203	1,107	393	328	111,265	92,333	456,349 72	27	25,308 29	2,813 64
Edmonton	5,632	154	3	8	2,303	2,972	2,360	786	93,388	108,361	419,017 53	33	28,319 00	3,572 90
Grande Prairie	898	34	.....	.....	387	287	401	128	7,099	6,460	15,650 34	3	3,512 90	345 00
Gronard	1,061	15	.....	.....	122	437	433	153	5,585	7,730	22,819 33	7	5,659 25	1,914 15
Kamloops	446	24	.....	1	217	68	339	13	13,647	11,944	28,735 07	5	6,116 07	1,248 87
Lethbridge	257	19	44	6	737	220	534	53	38,721	28,437	319,201 36	6	6,442 93	812 71
Medicine Hat	447	5	210	23	1,154	559	340	447	26,247	21,384	156,846 75	12	10,969 76	986 00
New Westminster	219	6	.....	.....	34	94	.....	.....	3,052	3,536	31,852 64	3	3,760 00	155 00
Red Deer	785	19	88	29	909	432	270	254	34,592	21,903	277,570 85	9	8,426 64	6,550 27
Revelstoke	133	33	.....	5	12	71	86	2	7,038	6,638	7,379 10	4	3,327 15	502 18
Total	10,872	355	745	125	9,078	6,247	5,156	2,164	340,634	314,726	1,737,422 60	109	101,842 89	18,900 72
Total year 1913-4	14,114	592	1,601	263	10,774	7,769	3,583	1,986	269,464	299,861	1,206,938 67	101	93,645 93	12,283

B.—Dominion Land Sub-Agencies—Alberta and British Columbia—Work performed during the Departmental Year ending March 31, 1915.

Place.	Name.	Applications for Homestead.	Applications for Purchased Homestead.	Applications for Pre-emption.	Applications for Patent.	Applications for Inspection.	Applications for Timber Permits.	Applications for Hay Permits.	Amounts remitted to Land Officers.	Expenditure.	
										Salary.	Postage and Commissions.
									$ cts.	$ cts.	$ cts.
Alsask	Spicer, S. E.	103	9	59	393	95	.....	27	3,174 70	600 00	116 09
Athabasca	Rennison, W.	343	.....	.....	142	109	68	36	5,155 07	780 00	43 15
Bonnyville	Ostigny, M.	100	.....	.....	67	6	13	3	1,006 76	420 00	13 43
Brooks	Binns, H. P.	54	.....	28	316	72	3	2	4,417 75	600 00	40 93
Castor	Mercer, R. M.	99	4	8	198	73	.....	23	3,218 60	600 00	30 18
Daysland	Davidson, D.	23	1	.....	18	12	.....	4	362 40	300 00	8 25
Edson	Glover, F.	90	.....	.....	34	28	10	4	1,198 94	300 00	15 67
Entwistle	Brown, A.	143	.....	.....	68	35	43	17	1,802 74	480 00	23 28
Ft. Sask	Libby, J. J.	42	.....	.....	35	.....	51	7	660 35	600 00	8 68
Frog Lake	McGowan, J.	59	.....	.....	68	22	9	.....	592 25	300 00	4 95
Golden, B.C.	Gody, J. G.	60	.....	.....	18	.....	49	.....	2,480 35	600 00	12 91
Grassy Lake	Snowden, T.	19	1	5	194	23	.....	1	901 50	480 00	10 71
Greencourt	Baly, H.	66	.....	.....	134	34	61	10	739 96	300 00	12 57
Hanna	Trenaman, J. C.	86	8	52	650	221	3	18	4,316 45	550 00	49 41
Innisfail	Stewart, J.	45	.....	.....	43	16	11	10	676 65	600 00	11 64
Innisfree	Montgomery, J. J.	69	.....	.....	71	39	2	4	815 20	300 00	11 40
Lacombe	Inglis, R. H.	38	.....	.....	39	32	4	6	19,633 78	600 00	65 81
Lac la Biche	LeGoff, V.	176	.....	.....	23	68	35	19	1,920 95	300 00	9 14
Leduc	Klein, O. P.	42	.....	.....	42	29	17	10	945 55	480 00	16 66
Lloydminster	Holland, W. H.	44	.....	.....	87	27	20	9	459 60	600 00	14 01
MacLeod	Barker, R. T.	60	1	1	38	26	59	2	2,049 75	600 00	8 78
Munson	Robinson, C. W.	53	3	21	380	95	13	19	2,552 90	600 00	20 55
Mosside	Whitaker, J. M.	52	.....	.....	165	4	24	15	559 37	300 00	7 80
Nanton	McLean, D. E.	25	....	1	30	13	19	2	8,832 20	300 00	25 33
Olds	Craig, R. A.	53	.....	.....	32	27	14	10	739 40	600 00	14 43
Oyen	Meacham, W. R.	144	9	98	516	170	.....	.....	6,221 79	300 00	39 69
Pine Creek	McDonald, S. A.	125	.....	.....	90	44	134	7	1,323 08	600 00	17 23
Ponoka	Franks, T. W.	82	.....	1	62	39	5	2	737 70	600 00	21 48
Provost	King, G. A.	158	9	12	324	84	90	19	6,676 01	540 00	51 23
Ry. Mt. House	Hankinson, R. J.	163	.....	.....	131	48	74	10	1,976 45	420 00	21 10
Shaftsbury	Carson, J. E.	546	.....	.....	11	99	162	16	7,450 92	600 00	10 43

B.—Dominion Land Sub-Agencies—Alberta and British Columbia—Work performed during the Departmental Year ending March 31, 1915.——*Concluded.*

Place.	Name.	Applications for Homestead.	Applications for Purchased Homestead.	Applications for Pre-emption.	Applications for Patent.	Applications for Inspection.	Applications for Timber Permits.	Applications for Hay Permits.	Amounts remitted to Land Officers.	Expenditure.	
										Salary.	Postage and Commissions.
									$ cts.	$ cts.	$ cts.
Saddle Lake	Ingraham, C. B	94	.....	.....	34	24	18	4	1,116 30	300 00	5 89
Salmon Arm, B.C	Lacey, J	118	.....	.....	13	33	15	.....	1,573 25	600 00	
Sedgewick	McDonald, J. S	108	.....	6	120	26	.....	9	3,151 00	240 00	19 74
St. Paul des Metis	Racicot, P	328	2	.....	142	107	152	23	3,913 93	600 00	21 84
Stettler	Gray, W. B	71	1	19	154	99	5	17	5,036 99	1,500 00	37 75
Trochu	Garrick, W. H. S	13	.....	6	45	29	6	4	1,001 00	300 00	6 46
Vegreville	Douglas, S. R	156	3	.....	64	90	42	4	1,854 30	600 00	20 52
Vermillion	Mace, Job	146	.....	.....	257	112	21	3	2,287 18	720 00	
Vulcan	Flood, A. J	6	2	3	146	20	.....	5	784 70	300 00	5 98
Wainwright	McLeod, H. W	92	2	6	213	52	.....	1	2,333 50	600 00	18 80
Westlock	Alton, B.C	150	.....	.....	177	60	20	153	1,893 74	420 00	21 02
Wabamun	Laight, G. C	70	.....	.....	88	64	19	3	844 00	240 00	14 17
Whitford	Hughson, W. S	159	.....	.....	55	53	135	3	2,010 88	600 00	11 54
Youngstown	Snell, F. E	100	15	57	670	218	.....	19	6,577 79	480 00	60 32
Wetaskiwin	Spencer, F. P	65	.....	.....	40	22	34	10	1,002 90	600 00	16 11
Yeoford	Wenham, M	17	.....	.....	40	7	14	4	227 75	300 00	6 93
		5,046	70	383	6,677	2,606	1,479	576	129,268 33	23,650 00	1,023 98

C.—Statement of Principal Work performed by Homestead Inspectors in Alberta and British Columbia for Departmental Year ending March 31, 1915.

Name.	Headquarters.	Land Inspections made.	Patents received.	Miles travelled		Travelling Expenses for self and team	Salaries.	
				Wagon.	Rail.			
Tempany, Wm.	Calgary	318	12	5,956	2,857	1,662 15	1,300 00	
Woodlock, P. A.	"	305	16	5,059	5,855	1,482 00	1,300 00	
Bruce, A. S.	"	217	33	5,414	3,811	1,793 85	1,200 00	
Kembry, R. A.	"	204	18	4,006	4,994	1,645 37	1,200 00	Commenced duties in June.
Blackwell, A. J.	Edmonton	190	10	5,002	4,263	1,080 85	1,200 00	
Cunningham, T. J.	"	273	33	4,041	2,827	1,099 25	1,500 00	
Doze, I. S.	"	560	2	5,015	1,800	991 10	1,300 00	
Grey, A.	"	367	4	5,434	2,182	1,395 95	1,200 00	
Hagen, S. C.	"	362	8	4,419	1,945	750 15	1,300 00	
McConnochie, A.	"	279	6	3,227	3,183	1,093 25	1,300 00	
Wynne, A. E.	"	235	16	4,285	1,278	948 77	1,300 00	
Fane, W. W.	"	65	3	1,709	1,160	443 75	1,500 00	On active Military Service since November.
Switzer, W.	Medicine Hat	106	8	476	1,107	891 70	1,200 00	
Huntley, J. R.	"	94	19	3,495	144	929 25	1,200 00	
Ripley, R.	Lethbridge	220	165	3,203	526	774 25	1,200 00	
Scott, H.	"	152	32	3,536	2,044	934 90	1,300 00	
Grasse, P. L.	Red Deer	229	9	4,950	2,375	1,253 45	1,300 00	
McMorris, Geo.	"	163	28	2,206	4,098	898 82	1,200 00	
McMullen, J. E.	Grouard	135	66	3,681	1,409	1,446 13	1,300 00	
Fletcher, Jos.	Grand Prairie	174	15	4,992	270	1,102 80	1,200 00	
Benzie, J. M.	Kamloops	447	5	3,715	3,031	1,427 50	1,200 00	Agent of Dominion Lands, also Homestead Inspector.
Magee, W. D.	New Westminster	222	.....	1,578	4,775	607 80	.....	
Cook, H.	Revelstoke	92	4	753	2,448	400 69	1,200 00	
Totals	.....	5,409	512	86,152	58,382	25,053 13	27,900 00	

No. 5.

REPORT OF THE AGENT OF DOMINION LANDS, BATTLEFORD, SASKATCHEWAN.

The past winter has been unusually mild, with just enough snow for fair sleighing, and free from any storms. The average temperature for our three winter months having been as follows: December 5, January 4, February 13. The snow went away early in March, and on the 13th instant the thermometer went up to 78° in the shade.

Seeding has been in progress for over a week past, and the ground is in the very best condition, owing mainly to the heavy rains we had late last fall. I am advised that there is an increase of at least 25 per cent in cultivation this spring throughout the district.

The Calgary oil movement had its counterpart on a small scale in this neighbourhood early last summer, when a number of claims were filed, the location being about 15 miles west of Battleford. As far as I am aware, actual developments were carried on by only one company, but it does not appear to have had any material results.

This staff is pleased to be represented at the front by two of its members, Messrs. C. H. Price and R. H. Burton who enlisted last August and went across with the first Expeditionary Force. The remainder of the staff deserve commendation for their efforts in keeping up the work.

The following is a statement of the work performed during the past year and revenue collected:—

	No.	Amount.
Homestead entries	1,263	$12,610 00
Pre-emption entries	49	490 00
Purchased homestead entries	17	170 00
Improvements	145	6,373 50
Land sales	55	3,022 97
Pre-emption payments	71	9,382 80
Purchased homestead payments	101	10,314 31
Searches, etc	498	176 50
Townsite sales	3	79 11
Timber permits (Dominion Lands)	707	495 71
Timber seizures (Dominion Lands)	10	48 02
Hay permits (Dominion Lands)	145	505 17
Grazing rentals (Dominion Lands)	169	749 83
Timber permits on forest reserves	445	339 05
Grazing rentals, forest reserves	42	511 00
Mining fees and rentals	72	5,507 43
Hay permits, school lands	203	419 10
Grazing rentals, school lands	50	607 38
Seed grain and provision repayments	13	840 84
Applications for patent received	1,227	
Applications for cancellation received	451	
Entries cancelled	918	
Letters received	27,946	
Letters written	32,457	
Total revenue		$52,642 72

L. P. O. NOEL,
Agent of Dominion Lands.

No. 6.

REPORT OF THE AGENT OF DOMINION LANDS, BRANDON, MANITOBA.

I beg to submit my annual report of work performed in this agency for the fiscal year ending the 31st March last:—

Homestead entries granted	48
Land sales	12
Hay permits, Dominion lands	85
Hay permits, Forestry Branch	55
Hay permits, school lands	62
Timber permits, Forestry Branch	145
Letters received	3,911
Letters written	4,030
Entries cancelled	26
Applications for patent received	25

L. J. CLEMENT,
Agent of Dominion Lands.

No. 7.

REPORT OF THE AGENT OF DOMINION LANDS, CALGARY, ALBERTA.

I have the honour to submit herewith the following statement showing in detail the business transacted in the Dominion Lands Branch of this office during the twelve months ending 31st of March last:—

	Number.	Amount.
Homestead fees	994	$ 9,850 00
Pre-emption fees	400	3,980 00
Purchased homesteads	53	530 00
Improvements	231	13,025 29
Land sales	46	6,552 26
Pre-emption payments	375	63,830 21
Purchased homestead payments	172	17,868 35
Searches, etc	422	105 50
Applications for patent	3,203	
Application for cancellation	898	
Entries cancelled	1,107	
Seed grain payments	10	391 93
		$116,133 54

A comparison of this year's statement with that of last year shows the number of entries granted to be only about half that of the preceding year, but this is accounted for by the fact that practically all the first-class land in this district is taken up. Under the recent change, however, which has been made in the regulations permitting the substitution of stock for cultivation, the remainder of the available land is being rapidly filed on.

W. E. TALBOT,
Agent of Dominion Lands.

No. 8.

REPORT OF THE AGENT OF DOMINION LANDS, DAUPHIN, MANITOBA.

Synopsis of principal items of work passed through the Dauphin Lands and Crown Timber Office during the fiscal year ending March 31, 1915:—

	Number.	Cash.	Total.
Homesteads	1,313	$ 13,130 00	
Improvements	113	3,800 25	
Land sales, cash	13	713 99	
Searches	319	79 75	
Applications for patents	523		
Applications for inspections	296		
Entries cancelled	536		
			$ 17,723 99
Timber and Grazing Crown Lands—			
Timber permits	496	$ 910 35	
Timber seizures	39	499 60	
Hay permits	166	418 60	
Grazing rentals	21	92 30	
			$ 1,920 85
Forestry Branch—			
Timber permits	1,089	$ 6,648 41	
Permit fees and rental	55	1,256 65	
Seizures	22	308 13	
Grazing rentals	7	124 25	
Hay dues	111	201 25	
			$ 8,538 69
Mining Lands—			
Mining fees	194	$ 970 00	
Rentals	94	2,702 50	
Sundries	60	159 50	
			$ 3,832 00
School Lands—			
General sales	1	$ 180 00	
Timber permits	6	28 00	
Hay permits	130	283 30	
Grazing rentals	20	326 77	
			$ 818 07
Miscellaneous—			
Seed grain (paid)	4	.....	$ 90 16
			$ 32,923 76
Letters received	32,714	.....	
Letters written	25,621	.....	
Staff and salaries	8	.....	$ 8,999 92
Disbursements, postage, etc	.....	.....	831 25

E. WIDMEYER,
Agent of Dominion Lands.

No. 9.

REPORT OF THE AGENT OF DOMINION LANDS, EDMONTON, ALBERTA.

I have the honour to submit the annual report of the Dominion Lands Office at Edmonton for the year ending the 31st March, 1915.

The work of the office has been remarkably heavy, the total revenue amounting to $419,017.53, as compared with $251,697.73 for the preceding year.

The homestead entries, which indicate to an extent the immigration to the district, shows a diminution of only 110 as against the previous year, the figures being: for 1914-15, 5,632; and for 1913-14, 5,742. Considering the large amount of land that has been taken up in this district in previous years, this is a remarkably good showing.

A very pronounced feature of this year's work was the abnormal activity in petroleum claims. The revenue from the Mines and Yukon Branch, which includes petroleum fees and rentals, amounted to $255,506.14, as compared with $69,879.16 of the previous year. The European war put a stop to considerable development, as might be expected. Notwithstanding that, however, some drilling operations are being carried on, the operators being very sanguine of obtaining good results.

The extension of time granted by the department within which to pay the second year's rental and commence operations is very much appreciated by all parties interested, and if the war continues up to or near the time of the present extension, in view of the present financial conditions I believe it would be wise to grant a further extension to enable lessees to interest capital in the development of their claims.

The commencement of hostilities in Europe had a decidedly panicky effect on business in general. This feeling has been very gradually wearing away, and people are now facing the position in a more optimistic spirit. A large amount of fall ploughing was done last year, and everywhere there has been an attempt to bring as much land as possible under cultivation. Should the crop of 1915 prove up to the average, with the additional area under cultivation, and the war prices to be obtained, a revival of the prosperity of a few years ago may be confidently anticipated.

Appended is a statement of the year's work:—

STATEMENT of the Business transacted at the Edmonton Dominion Lands Office and Crown Timber Agency for the twelve months ending March 31, 1915.

Patent Branch—	Number.	Amounts.	
Homestead fees	5,632	$56,220 00	
Pee-emption fees	3	30 00	
Purchased homestead fees	8	80 00	
Improvements	535	13,634 15	
Lands sales—cash	154	8,666 53	
Purchased homestead paymen's	36	4,302 74	
Pre-emption payments	10	1,621 29	
South African scrip	....		
H. B. scrip	....		
Searches, maps, office fees, etc	320	80 00	
Applications for patents received	2,303		
Applications for inspections received	1,736		
Entries cancelled	2,972		
Sundries	3	56 10	
Total			$84,690 81

Timber and Grazing Branch—			
Bonus	2	$ 4,095 46	
Ground rent	82	5,092 46	
Royalty on sales	55	5,885 75	
Timber permits	2,327	5,576 44	
Timber seizures	85	3,601 60	
Hay permits	447	1,003 15	
Grazing rentals—cash	12	105 24	
Grazing rentals—scrip	....		
Fireguarding	6	105 55	
Sundries	619	27,872 26	
Total			$ 53,337 91
Forestry Branch—			
Timber dues	6	$ 10 50	
Permit fees and rental	17	1,458 91	
Seizures	3	813 05	
Grazing rent, etc	9	5 00	
Hay dues, etc	15	72 70	
Total			2,360 16
Irrigation Branch—			
Sales	....		
Mining Lands and Yukon Branch—			
Mining fees	197	$ 2,220 00	
Rental	40	13,683 39	
Royalty	36	9,387 45	
Purchased mining claims	....		
Assessment payments	4	400 00	
Coal permits	5	1 80	
Sundries	2,142	229,813 50	
Total			255,506 14
School Lands Branch—			
General sales	3	$ 397 50	
Timber permits	16	444 58	
Hay permits	330	723 95	
Grazing rentals	76	826 44	
Mining fees	1	5 00	
Coal rental	2	216 90	
Coal royalty	1	6 06	
Coal permits	....		
Sundries	234	19,740 33	
Total			22,360 76
Miscellaneous—			
Seed grain and provision repayments	17	$761 75	
Total			176 75
Grand total			$419,017 53

General—		
Letters received	93,388	
Letters written	108,361	
Number of staff and salaries	....	$ 28,319 90
Disbursements	....	3,572 12

A. NORQUAY,

Agent of Dominion Lands.

No. 10.

REPORT OF THE AGENT OF DOMINION LANDS, ESTEVAN, SASKATCHEWAN.

I have the honour to submit the following statement of work for the fiscal year ending March 31, 1915:—

	Number.	Amount.	
Patent Branch—			
Homestead fees	50	$ 500 00	
Pre-emption fees	1	10 00	
Purchased homesteads	1	10 00	
Improvements	6	513 00	
Lands sales—cash	2	200 20	
Lands sales—scrip	....		
Pre-emption payments	2	222 60	
Purchased homestead payments	1	160 00	
Searches, maps, sales, etc	23	5 75	
Application for patent received	64		
Application for inspections	21		
Entries cancelled	24		
Total			$1,621 55
Timber and Grazing Branch—			
Hay permits	4	$11 00	
Grazing rentals	11	36 80	
Total			47 80
Forestry Branch—			
Timber dues	85	$121 00	
Permit fees and rental	87	21 75	
Seizures	7	10 25	
Grazing rent	4	18 00	
Hay dues, etc	13	22 00	
Total			193 00
Mining Lands and Yukon Branch—			
Mining fees	44	$ 220 00	
Rental	31	1,874 43	
Royalty	30	1,015 82	
Petroleum and gas	37	3,140 00	
Total			6,250 25
School Lands Branch—			
Hay permits and dues	72	$146 90	
Grazing rntals	11	135 92	
Mining fees	7	35 00	
Coal rental	5	138 25	
Coal royalty	8	554 95	
Petroleum and gas	5	320 00	
Total			1,331 02
Miscellaneous—			
Seed grain and provision payment	3	$165 35	
Total			165 35
Grand total			$9,608 97
General—			
Letters received	3,714		
Letters written	1,952		
Number of staff and salaries	3	$3,424 93	
Disbursements	....	221 15	

R. C. KISBEY,
Agent of Dominion Lands.

No. 11.

REPORT OF THE AGENT OF DOMINION LANDS, GRANDE PRAIRIE, ALBERTA.

Statement of work transacted for the year ending March 31, 1915:—

	Number.	Amount.	
Patent Branch—			
Homestead fees	898	$ 8,980 00	
Improvements	47	1,725 60	
Land sales	34	3,051 03	
Patent and interchange fees	8	80 00	
Searches	17	4 25	
Applications for patent	387		
Applications for inspection	106		
Entries cancelled	287		
Total			$13,840 88
Timber and Grazing Branch—			
Timber permits	401	$ 250 90	
Timber excess	29	111 49	
Hay permits	110	314 10	
Grazing rentals	46	454 25	
Hay excess	4	6 10	
Total			1,136 84
Mining Lands and Yukon Branch—			
Mining fees	6	$ 25 00	
Rentals	3	91 80	
Royalty	3	7 00	
Coal permits	4	45 00	
Dredging leases	2	200 00	
Total			368 80
School Lands Branch—			
Hay permits	10	$ 13 50	
Grazing rentals	14	197 97	
Hay excess	1	15	
Total			211 62
Miscellaneous—			
Seed grain and provision repayments	1	$92 20	
Total			92 20
Grand total			$15,650 34

General—			
Letters received	7,099		
Letters written	6,460		
Staff	3	$3,512 90	
Disbursements	....	345 00	
Total		$3,857 90	

A. S. MACLEAN,
Agent of Dominion Lands.

No. 12.

REPORT OF THE AGENT OF DOMINION LANDS, GROUARD, ALBERTA.

It will be noticed that the number of homesteaders who entered on land in this district during the past year were fewer in numbers than figures show for the previous fiscal year, but this may in a great measure be accounted for by the German-European war, coupled with the general financial stringency which is universally prevailing consequent thereon.

It may also be assumed by glancing over the revenue derived from entries on the land, and comparing same with that of the previous year, that the office work of the agency here has decreased in proportion. On the contrary, I would state that there has been a marked increase of detail work, especially noticeable this spring, which has been brought about by an unusual number of inquiries from all parts of Canada and the United States, as well as personal inquiries direct at the office here.

Then, again, it may be cited that during the fiscal year ending the 31st March, 1914, there were certain lands opened up such as Peace River Crossing, Hudson Hope, etc., which caused a rush of entries, greatly increasing the revenue for this particular branch during that period. The general revenue, however, is much in excess of that of the previous year, arising from mining leases, special mention of which I refer to below.

The railways have and are continuing to make great progress throughout our territory, and from the centre of this district which can be said to be Peace River Crossing, Edmonton can now be reached after a journey of some twenty hours and from Grouard about six hours less time, whereas prior to the steel the journey took as many days.

The first shipment of grain from Peace River was made during the month of March over the new line of the Edmonton, Dunvegan and British Columbia railway, and in this connection it may be pointed out that heretofore the farmers were greatly handicapped as, owing to the lack of adequate transportation facilities, the settlers found it impossible to market their products to any advantage.

The railway now places them in touch with markets such as Edmonton and other centres. This rapid advance of the railways has put many new towns and villages on the map where before there were only a few scattered settlers, and if the present traffic over the steel is any criterion to go by as to the interest being taken in this new country, it can be expected that in the very near future there will be a large influx of settlers. The sub-office recently located at Shaftsbury has been removed to Peace River Crossing, which is a more central and better settled district. This change has already proved of great convenience, giving a much better service all round.

The marked increase in the business pertaining to the Mining Lands and Yukon Branch of this agency calls for some reference. In this connection it may be mentioned that quite recently prospectors have been rewarded by the discovery of oil and natural gas around the Smoky river, also certain parts of Lesser Slave lake and the Peace river.

All this has created a wide amount of interest on the part of mining prospectors and capitalists and has at the same time given much publicity to our district, which has already had its results in so far as the revenue increase in this branch brought about by the many resignations of mining leases.

In addition we have also received many applications for coal mining leases on land adjacent to the Peace river.

Statement of business transacted:—

	Fiscal Year Ending March 31, 1915.		Fiscal Year Ending March 31, 1914.	
	No.	Amount.	No.	Amount.
Homestead entries	10,610	$ 10,610 00	1,225	$ 12,250 00
Improvements	17	715 00	11	390 00
Land sales	15	1,011 83	17	1,305 82
Searches, maps, office fees, etc	216	55 75	400	102 75
Applications for patent received	122	.....	31	
Applications for inspection received	155	.....	300	
Entries cancelled	437	.....	14	
		$ 12,392 58		$ 14,048 57
Timber permits issued	433	484 73	244	786 49
Timber seizures	1	271 84	10	299 60
Hay permits	134	575 60	90	422 50
Grazing rentals	8	112 70		
		$ 1,444 87		$ 1,508 59
Forestry Branch—				
Hay	1	3 25		
Mining fees	84	8,152 95	26	90 00
Rentals	10	467 60	1	101 24
Coal permits	5	25 00		
Mining sundry, power of attorney and assignment	1	5 00		
		$ 8,650 55		$ 191 24
School Lands Branch—				
Hay permits	19	33 00	15	41 00
Grazing rentals	19	281 28	15	236 20
Cultivation permit	1	13 80	2	18 40
		$ 328 08		$ 295 60
Grand total	.....	$ 22,819 33		$ 16,044 00
Letters received	5,585	.....	3,627	
Letters written	7,730	.....	4,517	
Staff salaries (2 on active service)	7	5,659 25	4	4,708 80
Disbursements	.....	1,914 15	.....	1,499 47
		$ 7,573 40		$ 6,208 27

W. F. W. CARSTAIRS,
Agent of Dominion Lands.

No. 13.

REPORT OF THE AGENT OF DOMINION LANDS, HUMBOLDT, SASK.

The majority of the farmers of this district are going in for mixed farming, and shipments of hogs or cattle are made weekly or monthly from many points.

The crops averaged well over nearly the entire district, and in only a small portion of the western side has there been any shortage of seed.

Most of the homesteads being taken are north of the main line of the Canadian Northern railway, which is considered a good mixed-farming district, as wood, good water, and hay are easily obtained.

Since the last report the Dominion Lands Office has been moved into the new public building here, and the new quarters are more commodious and comfortable and more convenient to the public.

Summary of the work performed for the year ending March 31, 1915:—

	Number.	Revenue.
Patent Branch—		
Homesteads and fees	768	$ 7,680 00
Improvements	91	2,685 00
Land sales	27	1,628 69
Searches	425	106 25
Timber Grazing, etc.—		
Timber permits	179	65 25
Timber seizures	11	70 82
Hay permits	86	173 85
Grazing rentals	11	31 35
Timber—excess dues	10	16 95
Hay—excess dues	3	2 20
Mining Lands and Yukon—		
Petroleum leases	23	1,403 65
Mining fees	1	5 00
School Lands—		
Grazing rentals	87	790 74
Hay permits	206	422 65
Petroleum lease	1	6 80
Timber excess dues	1	10 25
Hay—excess dues	14	9 35
Seed grain payments	1	38 75
Total revenue		$15,147 55
Applications for patent	776	
Applications for inspection	449	
Entries cancelled	513	
Letters received	29,724	
Letters written	28,418	
Staff	8	
Salaries		$ 7,644 93
Disbursements		1,662 38

R. G. MACKEY,
Agent of Dominion Lands.

No. 14.

REPORT OF THE AGENT OF DOMINION LANDS, KAMLOOPS, B.C.

I beg to submit herewith my annual report, and regret to show a large deficit, for which the European war and a consequent financial depression existing in this country is mainly responsible.

In my previous report I was able to show a great increase (286 per cent over the former year) under the Patent Branch, caused by the opening up to settlement of lands in the Columbia valleys and around the Shuswap lakes, which had been held under reservation for a number of years.

The departmental decision to open up a new land district, with the agency situated at Revelstoke, seriously affected the territory under my charge, and withdrew from me a considerable source of revenue.

The lumber industry is practically stagnant, and as the yards are apparently overstocked, with no immediate prospects of selling, the whole business is at a standstill, with the exception of two mills, which are operating a little; and consequently, therefore, very little lumbering will be done this season.

Last year, due to a severe drought, the crops were a partial failure, and therefore there was a considerable shortage of seed, but through the generosity of the department, I was successful in securing a car of seed grain for distribution amongst the holders of unpatented homesteads.

Appended is a summary of the returns of this agency:—

	Number.	Revenue.
Patent Branch—		
Homesteads	446	$ 4,250 00
Purchased homesteads	1	10 00
Improvements	83	2,981 92
Land sales	24	1,368 02
Purchased homestead payments	2	40 20
Searches	402	146 35
Applications for patent	217	
Applications for inspection	180	
Entries cancelled	68	
Total		$ 8,796 49
Timber, Grazing, etc.—		
Ground rents	41	$ 1,633 93
Royalty	27	9,084 49
Timber permits	322	731 07
Timber seizures	48	1,025 50
Hay permits	6	7 00
Grazing	348	6,513 20
Registration fees	8	16 00
Fire guarding	6	321 29
Total		$19,332 48
Forestry Branch—		
Permit fees, etc.	17	$ 19 10
Rents	6	86 00
Hay dues	7	13 85
Total		$ 118 95

Mining Lands Branch—		
Mining fees	8	$ 40 00
Rental	16	446 65
Permits	1	0 50
Total		$ 487 15
Grand total		$28,735 07
Letters received		13,647
Letters written		11,944

W. C. COWELL,
Agent of Dominion Lands.

No. 15.

REPORT OF THE AGENT OF DOMINION LANDS, LETHBRIDGE, ALTA.

Work performed and revenue collected for the fiscal year ending the 31st of March, 1915:—

Patent Branch—	Number.	Revenue.
Homestead fees	257	$ 2,570 00
Pre-emption fees	44	440 00
Purchased homestead fees	6	60 00
Improvements	65	2,410 35
Land sales—cash	19	5,030 44
Pre-emption payments	130	26,986 20
Purchased homestead payments	39	4,309 77
Searches, map sales, and office fees	130	39 50
Applications for patents received	737	
Applications for inspections received	119	
Entries cancelled	220	
Sundries	3	14 00
Total		$41,860 26
Timber and Grazing Branch—		
Timber permits	102	$ 68 75
Hay permits	12	12 15
Grazing rentals—cash	143	2,732 73
Grazing rentals—scrip	2	400 00
Total		$ 3,213 63
Forestry Branch—		
Permit fees and rental	432	$ 618 93
Seizures	11	376 68
Grazing rent	84	3,175 50
Hay dues	19	87 00
Total		$ 4,258 11
Irrigation Branch—		
Sales	4	$ 434 50
Total		$ 434 50

Mining Lands and Yukon Branch—		
Mining fees	2,513	$ 12,675 00
Rental	2,490	233,003 91
Royalty	64	3,542 36
Coal permits	1	Free.
Sundries	100	225 30
Quarries	12	271 60
Total		$249,718 17
School Lands Branch—		
Hay permits	22	$ 33 95
Grazing rentals	77	1,370 39
Mining fees	176	880 00
Petroleum and gas and coal rental	176	16,232 80
Sundries	10	20 00
Total		$18,537 14
Miscellaneous—		
Seed grain and provision *re* payments	25	$ 1,179 55
Total		$ 1,179 55
Grand total		$319,201 36
General—		
Letters received	38,721	
Letters written	28,437	
Number of staff and salaries	6	$ 6,442 93
Disbursements	76	812 71
Total		$7,255 64

The increase in revenue collected over that of last year is $191,890.30. The office expenses for the year 1915 were $7,255.64 as against $8,406.92 for 1914, showing a decrease of $1,151.28.

J. A. REID,
Acting Agent of Dominion Lands.

No. 16.

REPORT OF THE AGENT OF DOMINION LANDS, MAPLE CREEK, SASKATCHEWAN.

The total revenue collected in this office during the year was $123,754.59, as per the following statement, which is a considerable decrease from the previous year; accounted for by the fact that the crop in 1914 in this district was almost a complete failure.

The outlook for the present year is good, and there will be a large acreage sown, thanks to the Dominion Government supplying all the seed grain that was necessary.

Statement of business transacted:—

	Fiscal year ending March 31, 1915.		Fiscal year ending March 31, 1914.	
	No.	Amount.	No.	Amount.
Patent Branch—				
Homestead fees	990	$ 9,900 00	2,771	$ 27,710 00
Pre-emption fees	633	6,330 00	1,696	16,960 00
Purchased homstead fees	48	480 00	126	1,260 00
Improvements	130	7,098 00	171	12,630 40
Land sales—cash	21	2,521 14	19	2,666 18
scrip S. A. S			15	
" N. W. H. B			2	
Pre-emption payments	165	32,131 61	819	76,781 31
Purchased homestead payments	118	13,374 64	356	37,256 04
Searches, map sales, office fees, etc	2,058	514 50	1,798	449 50
Applications for patent received	2,024		2,844	
Applications for inspection received	535		2,302	
Entries cancelled	654		2,132	
Sundries patent fees	1	10 00		
		$ 72,359 89		$ 175,713 43
Timber and Grazing Branch—				
Bonus excess hay			6	$ 3 60
Timber permits	687	$ 174 50	888	222 00
Timber seizures			1	75
Hay permits	237	366 25	205	403 80
Grazing rentals—cash	908	11,600 56	612	8,782 26
Sundries timber dues	29	24 20	19	31 60
		$ 12,165 51		$ 9,444 01
Forestry—				
Timber dues	45	$ 59 05	7	$ 30 75
Permit fees and rental	327	199 25	141	35 25
Seizures	1	3 00		
Hay dues, etc	73	203 40	45	173 00
		$ 464 70		$ 239 00
Irrigation Branch—				
Sales	15	$ 1,596 84	36	$ 10,263 29
		$ 1,596 84		$ 10,263 29
Mining Lands and Yukon Branch—				
Mining fees	120	$ 600 00	58	$ 290 00
Rental	133	32,424 80	19	1,381 65
Royalty	14	55 90	10	79 10
Coal permits	1	2 00		
		$ 33,082 70		$ 1,750 75
School Lands Branch—				
Hay permits	170	$ 428 80	111	$ 221 60
Grazing rentals	88	1,920 38	41	932 14
Mining fees	8	1,240 00	5	25 00
Mining rental	2	10 00		
Cultivation permits			2	1 30
Sundries excess hay			1	39 80
		$ 3,599 18		$ 1,219 84
Miscellaneous—				
Seed grain and provision repayments	11	$ 389 77	65	$ 2,721 07
Sundries refund of expenditure	2	126 00	2	26 00
			2	20 25
		$ 515 77		$ 2,767 32
Grand total		$ 123,784 59		$ 201,397 64
General—				
Letters received	45,162		50,692	
Letters written	41,290		52,539	
Number of staff and salaries		$ 12,283 42	15	$ 12,864 28
Disbursements		1,101 97		1,658 26

C. H. STOCKDALE,
Agent of Dominion Lands.

No. 17.

REPORT OF THE AGENT OF DOMINION LADS, MEDICINE HAT, ALBERTA.

Statement of Revenue year ending March 31, 1915:—

	For 12 Months Ending March 1915.		For 12 Months Ending March, 1914.	
	No.	Amount.	No.	Amount.
Patent Branch—				
Homestead fees	447	$ 4,470 00	1,158	$ 11,580 00
Pre-emption fees	210	2,100 00	574	5,740 00
Purchased homestead fees	23	230 00	56	560 00
Improvements	98	4,031 31	170	8,215 75
Land sales—cash	5	293 17	14	2,333 19
Patent fee	.....	.....	1	10 00
Pre-emption payments	93	18,647 92	465	30,479 46
Purchased homestead payments	71	7,337 30	166	18,343 86
Searches, map sales, office fees, etc	526	131 50	337	84 25
Applications for patent received	1,154	.....	1,601	
Applications for inspection received	218	.....	614	
Entries cancelled	559	.....	1,102	
Total	.....	$ 37,251 20		$ 77,346 51
Timber and Grazing Branch—				
Timber permits	64	$ 36 30	91	$ 32 90
Hay permits	173	216 85	163	166 70
Grazing rentals—Cash	602	20,260 30	526	99,078 20
Total	.....	$ 20,513 45		$ 19,277 80
Forestry Branch—				
Timber dues	118	265 61	1	1 50
Permit fees and rental	276	69 00	216	73 60
Seizures	7	26 15	3	56 20
Elkwater lake summer resort	89	490 00	.....	
Grazing rent, etc	1	25 60	.....	
Hay dues, etc	218	571 75	21	47 80
Total	.....	$ 1,448 11		$ 179 10
Irrigation Branch—				
Sales	7	1,393 74	9	$ 2,068 83
Total	.....	$ 1,393 74		$ 2,068 83
Mining Lands and Yukon Branch—				
Mining fees	17	980 00	28	517 50
Placer mining	48	240 00	.....	
Rental	16	366 66	34	1,491 82
Royalty	47	345 70	52	277 34
Quartz mining	2	7 50	.....	
Quarries	1	5 00	17	286 25
Assignment fees	33	66 00	.....	
Coal permits	1	5 00	2	4 00
Petroleum and natural gas	754	82,309 46	311	3,939 83
Total	.....	$ 84,325 32	.....	$ 6,516 74
School Lands Branch—				
General sales	13	$ 1,610 09	25	$ 16,325 46
Petroleum and natural gas	73	6,439 70	35	616 70
Hay permits	56	115 50	58	117 70
Grazing rentals	77	1,634 76	41	819 67
Mining fees	1	5 00	3	15 00
Coal rental	1	40 00	3	148 90
Assignment fee	2	4 00	.....	
Scrip, military	.....	.....	2	
Scrip, Half-breed	.....	.....	2	
Scrip, S. A. V. B. L. C.	.....	.....	8	
Total	.....	$ 9,849 05		$ 18,043 43

Statement of Revenue year ending March 31, 1915—*Concluded.*

	For 12 Months Ending March, 1915.		For 12 Months Ending March, 1914.	
	No.	Amount.	No.	Amount.
Miscellaneous—				
Seed grain and provision repayments	42	$ 2,075 88	156	$ 6,380 44
Total		$ 2,075 88		$ 6,380 44
Grand total		$ 156,846 75		$ 129,812 85
General—				
Letters received	26,247		29,178	
Letters written	27,384		29,394	
Number of staff and salaries		10,969 76		10,074 95
Disbursements		986 00		2,183 69

I am pleased to be able to point out that the last year's revenue exceeds that of the previous year by $27,000.

G. H. MACDONELL,
Agent of Dominion Lands.

No. 18.

REPORT OF THE AGENT OF DOMINION LANDS, MOOSEJAW, SASKATCHEWAN.

Annual report for the fiscal year ending March 31, 1915:—

Patent Branch—	Number.	Amount.	
Homestead fees	1,193	$ 11,930 00	
Pre-emption fees	621	6,210 00	
Purchased homestead fees	35	350 00	
Improvements	134	9,630 75	
Land sales—cash	30	2,165 07	
Pre-emption payments	280	66,439 49	
Purchased homestead payments	119	14,293 43	
Searches, map sales, office fees, etc.	2,153	538 25	
Applications for patent received	2,603	.....	
Applications for inspection received	591	.....	
Entries cancelled	999		
Total			$111,556 99
Timber and Grazing Branch—			
Timber permits	144	$ 46 00	
Excess on permit	2	1 75	
Hay permits	96	174 75	
Grazing rentals—cash	291	3,412 39	
Total			3,634 89
Forestry Branch—			
Seizures	1	$ 50	
Permit fees and rental	135	37 00	
Surface trespass	1	17 00	
Grazing rent, etc.	16	188 97	
Hay dues, etc.	6	19 25	
Total			262 72

Mining Lands and Yukon Branch—			
Quarrying fees	4	$ 20 00	
Mining fees—coal	33	165 00	
Rental—coal	29	555 17	
Royalty	17	106 95	
Petroleum and natural gas	40	5,007 43	
Petroleum and natural gas fees	40	200 00	
Quarrying rental	4	200 00	
Total			$ 6,254 55
School Lands Branch—			
Permits (wood)	1	$ 75	
Green wood	1	1 25	
Hay permits	381	915 20	
Grazing rentals	95	1,211 86	
Petroleum and natural gas	5	425 25	
Royalty	1	5 00	
Fees	1	5 00	
Excess on hay	1	40	
Total			2,564 71
Miscellaneous—			
Seed grain and provision repayments	9	$645 30	
Total			645 30
Grand total			$124,919 16

General—			
Letters received	34,725		
Letters written	32,278		
Staff salaries	....	$12,937 69	
Disbursements	....	1,253 00	

G. K. SMITH,
Agent of Dominion Lands.

No. 19.

REPORT OF THE AGENT OF DOMINION LANDS, NEW WESTMINSTER, B.C.

I have the honour to submit herewith a statement of the work performed at this agency for the fiscal year ending March 31, 1915.

This statement, I am pleased to say, compares very favourably with the receipts for the previous year, which were the largest in the history of the office.

Summary of receipts—		
Lands Patent Branch		$ 9,630 69
Mining Lands and Yukon Branch		22,221 95
		$31,852 64
Letters received	3,052	
Letters written	3,536	

Total receipts for year ending March 31, 1914, $31,986.59.

W. D. MAGEE,
Agent of Dominion Lands.

No. 20.

REPORT OF THE AGENT OF DOMINION LANDS, PRINCE ALBERT, SASKATCHEWAN.

Statement of business transacted for fiscal year ending March 31, 1915:—

	Number.	Revenue.	
Patent Branch—			
Homestead fees	1,567	$15,670 00	
Pre-emption fees	1	10 00	
Purchased homestead fees	3	30 00	
Improvements	123	2,194 30	
Lands sales—Cash	66	4,130 59	
Pre-emption payments	10	872 82	
Purchased homestead payments	17	1,150 35	
Searches, map sales, office fees, etc	541	135 00	
Applications for patent received	1,189		
Applications for inspection received	505		
Entries cancelled	747		
Sundries	1	2 00	
Total			$24,195 06
Timber and Grazing Branch—			
Bonus	3	$ 1,043 64	
Ground rent	21	6,960 24	
Royalty on sales	26	21,526 79	
Timber permits	1,203	7,100 04	
Timber seizures	32	1,962 28	
Hay permits	189	438 45	
Grazing rentals—Cash	27	202 91	
" " Scrip	1	36 92	
Sundries	1	50 46	
Total			39,321 73
Forestry Branch—			
Permit fees and rental	698	$1,904 04	
Seizures	10	223 45	
Grazing rent, etc	22	99 35	
Hay dues, etc	24	105 70	
Total			2,332 54
Mining Lands and Yukon Branch—			
Mining fees	1,409	$5,972 70	
Rental	1	55 00	
Coal permits	41	7,658 70	
Sundries	1	38 70	
Total			13,725 10
School Lands Branch—			
Timber permits	26	$290 37	
Hay permits	169	355 60	
Grazing rentals	39	355 81	
Mining fees	2	149 22	
Cultivation permits	6	53 95	
Total			1,204 95
Miscellaneous—			
Seed grain and provision repayments	3	$198 50	
Total			198 50
Grand total			$80,977 88
General—			
Letters received	27,947		
Letters written	40,960		
Number of staff and salaries	166	$12,847 64	
Disbursements	174	2,004 61	
Total		$14,852 25	

D. J. ROSE,
Agent of Dominion Lands.

No. 21.

REPORT OF THE AGENT OF DOMINION LANDS, RED DEER, ALBERTA.

Statement of business transacted for fiscal year ending March 31, 1915:—

	Number.	Revenue.	
Patent Branch—			
Homestead fees	795	$ 7,940 00	
Pre-emption fees	88	880 00	
Purchased homestead fees	29	290 00	
Improvements payments	110	4,906 13	
Land sales—Cash	19	907 41	
Pre-emption payments	47	9,383 09	
Pre-emption interests	27	370 67	
Purchased homestead payments	188	18,615 29	
Searches	174	43 76	
Total			$43,336 34
Timber, Grazing and Irrigation—			
Timber permits	258	$ 588 26	
Timber seizures	12	87 97	
Hay permits	60	361 22	
Grazing rental	24	135 42	
Hay excess	2	1 60	
Timber excess	16	203 37	
Total			1,377 84
Forestry Branch—			
Timber dues and fees	10	$ 42 06	
Timber excess	1	3 58	
Grazing rental	4	27 70	
Hay fees and dues	1	10 25	
Total			83 53
Mining Lands and Yukon Branch—			
Mining fees	2,146	$10,730 00	
Mining rental	27	2,420 88	
Mining royalty	75	2,626 25	
P. & G. assignment fees	120	235 10	
Coal permits	8	40 00	
Coal permits free	5	.....	
Petroleum	..	195,290 88	
Placer grants	8	40 00	
Power of attorney	1	2 00	
Total			211,385 11
School Lands—			
Timber permits	5	$ 13 25	
Hay permits	193	695 20	
Grazing rental	96	1,344 47	
Mining fees	195	875 00	
Coal rental	4	75 90	
Coal royalty	7	41 65	
Petroleum	194	17,841 25	
Hay excess	10	18 80	
Sale	1	94 12	
Coal permits	2	10 00	
P. & G. assignment fees	13	26 00	
Timber seizures	3	25 25	
Total			21,160 89
Miscellaneous—			
Seed grain	4	$ 227 14	
Total			227 14
Grand total			$277,570 85

Letters received	34,592
Letters written	21,903
Applications for patent	909
Application for inspection	425
Entries cancelled	432
Number of staff	9

P. PIDGEON,
Agent of Dominion Lands.

No. 22.

REPORT OF THE ACTING AGENT OF DOMINION LANDS, REGINA, SASKATCHEWAN.

We have been favoured with ideal weather throughout the whole of the winter, and conditions point to an early seeding.

The Regina district did not suffer to any great extent last season from lack of moisture, and a good crop was reaped which, together with the good prices realized, has created a feeling of security and contentment, and although the war has caused a slight business depression, every one is looking forward to the future with confidence and a good year is anticipated.

The following is a statement of the revenue received during the fiscal year ending March 31, 1915:—

	Number.	Revenue.	
Patent Branch—			
Homesteads	131	$ 1,310 00	
Improvements	16	1,333 90	
Land sales	12	1,321 25	
Pre-emption payments	1	150 60	
Purchased homestead payments	2	175 03	
Searches	176	44 00	
Applications for patents	185		
Applications for inspection	80		
Entries cancelled	69		
Total			$4,334 78
Timber and Grazing—			
Hay permits	4	$ 9 50	
Grazing rentals	4	4 52	
Total			14 02
Forestry Branch—			
Timber dues	69	$ 115 10	
Lot rentals	9	42 00	
Seizures	30	88 95	
Grazing rent, etc	13	116 00	
Hay dues	16	48 10	
Total			410 15
Mining Lands and Yukon Branch—			
Mining fees	6	$ 30 00	
Rental	4	384 50	
Total			414 50
School Lands Branch—			
General sales	3	$ 2,826 82	
Timber permits	6	11 00	
Hay permits	257	841 25	
Grazing rentals	80	765 81	
Sundries	4	5 45	
Total			4,450 33
Miscellaneous—			
Seed grain and provision payment	7	$ 300 21	
Letters received	7,098		
Letters written	7,304		

C. HARRIS,
Acting Agent of Dominion Lands.

No. 23.

REPORT OF THE AGENT OF DOMINION LANDS, REVELSTOKE, B.C.

The amount of business transacted during the past year by this agency, especially in the Lands Branch, has been very gratifying as the area of available lands of a class suitable for farming is not large, inasmuch as it only consists of the bottom and bench lands in the Columbia valleys from Golden to the southern limit of the belt, and from Revelstoke to the southern boundary. In the latter mentioned district the land is chiefly held under timber license. This is gradually being withdrawn from timber berth and is immediately filed on by settlers as soon as it is made available.

The revenue derived in the Timber and Grazing Lands Branch is not as large as might be expected when the area of land held under timber license is taken into consideration, but the extraordinary financial depression is of course the cause for this, inasmuch as the lumber industry is and has been practically at a standstill for the last year. There is, however, every indication at the present time of a revival in this business.

Very little business has been done in the Mining Lands and Yukon Branch beyond the little excitement caused in June last by the discovery of natural gas at Arrowhead.

Numerous inquiries as to available lands have been made during the past year, all of which have received very careful attention.

Following is an itemized list of all transactions:—

Patents Branch—	Number.	Amount.
Homestead fees	133	$1,320 00
Purchased homestead fees	5	50 00
Improvements	18	1,219 00
Townsite sales	33	1,013 61
Purchased homestead payments	9	312 02
Searches, map sales, etc	65	14 05
Applications for patent	12	
Applications for inspection	40	
Cancellation	71	
Total		$3,928 68
Timber and Grazing Lands Branch—		
Ground rents	38	$ 969 25
Royalty on sales	9	915 03
Timber permits and dues	86	120 16
Seizures	8	223 18
Hay permits	2	5 40
Grazing leases	2	6 40
Registration fees	2	5 00
Fire guarding dues	5	358 82
Total		$2,603 25
Mining Lands and Yukon Branch—		
Rentals	17	$724 43
Application fees	14	70 00
Total		$794 43

Considerable revenue has been paid into head office, especially in the Timber and Grazing Branch, which should go to the credit of this office.

In conclusion, I wish to take this opportunity of expressing my thanks to the staff, one and all, for their able assistance and I respectfully submit that their services are worthy of your recognition.

T. J. WADMAN,
Agent of Dominion Lands.

No. 24.

REPORT OF THE AGENT OF DOMINION LANDS, SASKATOON, SASK.

I have the honour to submit herewith my annual report of the work of this office for the fiscal year ending March 31, 1915.

The homesteaders in the Saskatoon land district, the last year, have had no reason to be discouraged. It is a known fact that this district has had ten successive years of crops, which gave profitable returns, and although the drought of the last season, along with the financial depression, affected some parts, the Dominion Government's timely aid in supplying seed grain, food and clothing for those who were in any way destitute, along with the protection granted homesteaders, enabled even the new beginner to hold his stock and prepare his soil for larger and better returns and a happier home for the future. A 30 per cent increase is now being seeded, and the prospects for a bumper crop never looked brighter.

The following is a partial list of the work performed during the last fiscal year:—

Letters received	36,997
Letters written	43,053
Homestead entries	$ 816 00
Pre-emption entries	181 00
Purchased homestead entries	73 00
Improvement payments	126 00
Land sales—Cash	40 00
Pre-emption payments	181 00
Purchased homestead payments	343 00
Searches	1,718 00
Applications for patent	2,157 00
Applications for inspection	788 00
Entries cancelled	823 00
Timber permits	276 00
Grazing rentals	82 00
Hay permits	439 00
Mines Branch—	
Coal, petroleum and natural gas, sand and gravel, fees and rentals	329 00
Seed grain payments	9 00
Total revenue collected	$116,007 24

M. A. MACINNES,
Agent of Dominion Lands.

No. 25.

ANNUAL REPORT OF THE AGENT OF DOMINION LANDS, SWIFT CURRENT, SASKATCHEWAN.

I beg to submit the annual report of this Dominion Lands Office, for the year 1914-15.

Not only have our economic conditions been largely affected by the war, but in the year 1914 this district passed through a period of drought hitherto fortunately unknown in its history. As a result of these two causes the agricultural industry of this district suffered severely.

In the fall of 1914, however, the Department of the Interior, after carefully inquiring into conditions, granted necessary relief to the settlers, and this action on the part of the department has been of untold value to our settlers of this agency, more because of the fact that the settlement of this district is now about six years old.

I am glad to report that present prospects for a good crop in 1915 are all that could be desired. We had abundant rain in the fall of 1914, and in the month of May we have had copious rains in this district, and at the present time the crop is in a most healthy condition and we expect an abundant harvest.

Whilst the summary of work will show a falling-off in the number of applications for inspection received and in the entries cancelled, which is accounted for by the general protection granted by the department to settlers permitting them to leave their land without danger of cancellation, still the general routine work of the office has not diminished; in fact, in order to cope with the extra work caused through relief, the staff had during the winter months to put in quite a lot of overtime.

I attach a summary of the work performed in this agency during the past fiscal year.

Summary of work, Dominion Lands Office, Swift Current, Sask., during the twelve months ending March 31, 1915:—

	Number.	Amount.
Homesteads	732	$ 7,310 00
Pre-emptions	426	4,260 00
Purchased homesteads	43	430 00
N.W.H.B. scrip	1	
Improvements		6,400 60
Land sales		1,862 46
Pre-emption payments		48,696 66
Purchased homestead payments		16,305 61
Searches, etc.		564 75
Timber and Grazing Branch		3,905 10
Forestry Branch		48 85
Irrigation Branch		227 40
Mining Land and Yukon Branch		2,746 95
School Lands Branch		3,359 27
Seed grain repayments		1,120 91
Total		$97,238 56
Letters received	25,064	
Letters written	31,107	
Applications for patent received	2,301	
Applications for inspection received	501	
Entries cancelled	615	

F. G. FORSTER,
Agent of Dominion Lands.

No. 26.

REPORT OF THE AGENT OF DOMINION LANDS, WEYBURN, SASK.

We beg to report slight increase in homestead and pre-emptions, not much advantage taken of privilege of proving up in three years, owing possibly to scarcity of money. New grazing laws meet with approval, especially those excluding all but British subjects. Oil rush. We were fortunate in not being in the dry area of 1914. There were few cases of hail, doing however, little damage. The homesteaders in the winter of 1914 and 1915 have been in excellent shape, compared with other years, having provided themselves with some cash to tide them over the winter, and there were very few cases of want. The only trouble seems to have been owing to seizures made on patented and unpatented lands for taxes. The crop this spring is in excellent condition, and from present indications look like a bumper crop.

Statement of business transacted for fiscal year ending March 31, 1915:—

	Number	Revenue.	
Patent Branch—			
Homestead fees	445	$ 4,450 00	
Pre-emption fees	203	2,030 00	
Purchased homestead fees	15	150 00	
Improvements	56	4,070 30	
Land sales—Cash	7	1,338 09	
Pre-emption payments	166	38,279 53	
Purchased homestead payments	47	7,000 59	
Searches	546	136 50	
Applications for patent received	611		
Applications for inspection received	286		
Entries cancelled	366		
Total			$57,455 01
Timber and Grazing Branch—			
Timber permits	10	$ 2 50	
Hay permits and excess	53	162 70	
Grazing rentals—Cash	43	390 27	
Total			555 47
Mining Lands and Yukon Branch—			
Mining fees—stone and sand	1	$ 5 00	
Rental	5	90 00	
Royalty	8	87 42	
Coal permits	4	20 00	
Sundries—Oil and natural gas	89	4,302 00	
Total			4,504 42
School Lands Branch—			
Hay permits and excess	172	$ 511 05	
Grazing rentals	34	384 36	
Coal rental	1	40 00	
Coal royalty	1	117 46	
Coal permits	2	10 00	
Sundries	8	450 00	
Total			1,512 87
Grand total			$64,027 77
General—			
Letters written	6,152		
Letters received	96,751		
Number of staff and salaries	5	$ 5,209 96	
Disbursements		408 00	

S. C. MURRAY,

Agent of Dominion Lands.

No. 27.

REPORT OF THE AGENT OF DOMINION LANDS, WINNIPEG, MAN.

The following summary shows the amount of revenue collected, and work performed, detailed under their different headings:—

	Number.	Revenue.	
Patent Branch—			
Homestead entries	3,058	$30,570 00	
Improvements	238	8,745 68	
Land sales—Cash	50	10,879 48	
Searches, maps, etc	201	88 25	
Seed grain	20	608 04	
Total			$50,891 45
Mines Branch—			
Mining fees	1,075	$4,538 40	
Rentals	79	3,183 38	
Quarries	45	285 50	
Assessment payments	6	600 00	
Sales	5	150 91	
Coal permits	2	10 00	
Petroleum	5	100 00	
Total			8,868 19
School Lands—			
Sales	12	$1,427 73	
Petroleum and gas	1	5 00	
Total			1,432 73
Grand total			$61,192 37
Applications for patents received	583		
Applications for inspection	815		
Entries cancelled	1,090		
Letters received	33,296		
Letters written	39,010		

L. RANKIN,
Agent of Dominion Lands.

No. 28.

REPORT OF THE AGENT OF DOMINION LANDS, YORKTON, SASKATCHEWAN.

I beg to submit herewith report of this office for the year ending March 31, 1915:—

	Number.	Revenue.
Homestead entries	863	$7,000 00
Improvements	65	3,232 30
Land sales	13	873 59
Searches, etc	357	99 50
Timber permits, T. G. & I	202	240 14
" seizures	2	16 05
Hay permits	36	132 40
Grazing rentals	2	4 80
Timber permits, Forestry Branch	234	272 85
Permit fees and rentals	61	171 10
Grazing rents, etc	3	10 70
Hay dues, etc	30	51 80
General sales, S.L.B	12	1,806 27
Timber permits	2	17 00
Hay permits	126	295 90
Grazing rentals	16	148 25
Seed grain and provision repayments	5	221 07
Applications for patent	807	
" inspection	336	
Entries cancelled	307	
Letters received	14,833	
" sent	17,450	
Total		$14,593 72

J. A. DUNCAN,
Agent of Dominion Lands.

No. 29.

REPORT OF THE MINING LANDS AND YUKON BRANCH.

OTTAWA, June 1, 1915.

W. W. CORY, Esq., C.M.G.,
Deputy Minister of the Interior,
Ottawa.

SIR,—I have the honour to submit herewith the report of the Mining Lands and Yukon Branch of the Department of the Interior for the fiscal year which ended on the 31st of March, 1915.

The total revenue of this branch, derived from all sources during the fiscal year, amounts to $1,604,215.60. Owing to the conditions resulting from the war a general extension of time for one year from the 15th of October, 1914, was granted within which to pay the rental of all petroleum and natural gas locations, and extensions of time have also been granted in a great many cases within which to pay the rental of coal and other mining locations. Notwithstanding this fact, an increase in revenue of $719,554.36 over the previous year is shown.

The statements lettered "A" and "B," showing in different forms how this amount is made up, will be found at the end of this report. The statement lettered "A" shows the total revenue for each month, and the statement lettered "B" shows the revenue collected at each agency, including the Yukon Territory.

The revenue for the Yukon Territory, which amounts to $211,124.34, is shown separately in the statement lettered "C."

The reports and statements for the fiscal year from the commissioner, gold commissioner, assistant gold commissioner, crown timber and land agent, comptroller and the territorial assayer will be found under this part of the report.

TIMBER IN THE YUKON TERRITORY.

The total amount of dues collected on account of timber in the Yukon Territory during the fiscal year was $11,797.12. During the year, 144 permits were issued, under the authority of which 350,000 feet board measure of timber, and 19,819 cords of wood were cut. The dues collected on permits issued amounted to $7,734.06.

There are in existence 141 timber berths held under license to cut timber within the territory, covering an area of 259.86 square miles, which licenses were granted prior to the 10th of May, 1906, on which date the regulations governing the granting of licenses to cut such timber in the territory were rescinded, and regulations for the issue of permits to cut timber substituted therefor. Three saw-mills are now in operation within the territory.

According to returns received in the department, the number of feet (board measure) of lumber manufactured under license during the year was 173,425, and the quantity sold 173,425 feet board measure. Seizure dues amounting to $1,273.75 were collected on 1,842 cords of wood, 8,000 feet board measure of timber, and 2,799 lineal feet of building logs cut in trespass. This does not include the very large amount of timber and cordwood cut free of dues for mining purposes.

MINING LANDS OTHER THAN COAL.

During the fiscal year 1,818 entries for quartz mining claims, and thirty-one entries for placer mining claims were granted by the agents of Dominion Lands in Manitoba, Saskatchewan, and Alberta.

In the Yukon Territory, 44,034 placer mining claims, 11,072 quartz mining claims, and 92,946 renewals and relocations were recorded up to the 31st of March, 1904.

According to the returns received during the fiscal year, 920 entries for placer mining claims, 172 entries for quartz mining claims, and 4,193 renewals and relocations were recorded during that period. The revenue collected from these sources and from fees for registering documents in connection with mining operations was $61,087.50.

ROYALTY ON GOLD MINED IN THE YUKON TERRITORY.

The total amount collected up to the 31st of March, 1915, for royalty on the gross output of placer mining claims in the Yukon Territory, after deducting the exemption at one time allowed under the regulations, was $4,372,504.98, of which amount $116,241.04 was collected during the last fiscal year. For the purpose of estimating this royalty, the gold is valued at $15 an ounce, which is much below its real value.

The actual value of gold produced from placer mining operations in the Yukon Territory up to the 31st of March last might be safely placed at $137,967,981.

The following statement shows the agencies at which the royalty was collected and the amount collected at each during the year:—

Dawson	$115,890 11
Whitehorse	350 93

The statement lettered "E" at the end of this report shows the total gold production, the total production subject to royalty, and the total royalty collected for each fiscal year from the 1st of May, 1899, to the 31st of March, 1915.

DREDGING.

Twenty-two leases to dredge for minerals in the beds of rivers in the Yukon Territory are now in force, covering a total frontage of 144·65 miles. The total revenue derived from this source up to the 31st March, 1915, amounts to $195,470.66, of which amount $5,397.49 was collected during the fiscal year just closed.

These dredging leases are confined to the Yukon, McQuesten, Fortymile, Big Salmon, Klondike, and Sixtymile rivers.

There are in operation in the Yukon Territory, sixteen dredges. Most of these dredges are working on the Klondike river and tributaries, and are operated by hydro-electric motive power. Two of the largest gold-saving dredges in the world are now being operated most successfully on the Klondike river.

Sixteen leases to dredge for minerals in the submerged beds of rivers in the provinces of Alberta and Saskatchewan are now in force, covering a total frontage of 80 miles. Of these leases, eight are in the province of Alberta, and include 40 miles, and eight are in the province of Saskatchewan, and include 40 miles. The total revenue derived from this source up to the 31st of March, 1915, amounts to $45,090.70, of which amount $200 was collected during the past fiscal year.

HYDRAULIC MINING.

The hydraulic mining regulations relating to the Yukon Territory were rescinded by an Order in Council dated the 2nd of February, 1904, but leases already granted were not affected by such withdrawal.

There are still in force in the Yukon Territory, ten hydraulic mining leases, covering an area of 26·16 square miles. Since the hydraulic mining regulations were first established in December, 1898, forty-seven hydraulic mining leases have been issued, all of which have now been cancelled with the exception of the above number. It is considered that, under the grouping provisions of the Yukon Placer Mining Act, operators can now acquire and group for operation a sufficient area to warrant the installation of efficient hydraulic mining plants.

HOMESTEADS IN YUKON TERRITORY.

Seventy-one homestead entries in the Yukon Territory have been granted, of which forty-nine are now in force, comprising a total area of 7,412.22 acres. Patents have been issued for five homesteads.

PETROLEUM AND NATURAL GAS.

By an Order in Council dated the 19th of January, 1914, the regulations for the disposal of petroleum and natural gas rights the property of the Crown in the western provinces and territories were rescinded and new regulations substituted therefor. Under these regulations more than 12,000 applications for leases have been filed. No royalty will be charged on the sales of petroleum up to the 1st of January, 1930.

There are now in force under the regulations, 11,305 petroleum and natural gas leases, embracing a total area of 4,638,894.66 acres, distributed as follows: In the province of Alberta, 10,473 leases, comprising 4,258,065.21 acres; in the province of Saskatchewan, 470 leases, comprising 264,734.56 acres; in the Railway Belt of the province of British Columbia, 284 leases, comprising 98,594.65 acres; and in the province of Manitoba, seventy-five leases, comprising 17,500.24 acres. The total revenue derived from petroleum lands during the year amounts to $1,114,338.84.

Natural gas has been discovered and is now being utilized for commercial and domestic purposes in different parts of the province of Alberta, and petroleum, in what would appear to be paying quantity, has been discovered in the western portion of that province. Boring operations are now being carried on throughout Alberta and Saskatchewan with a view to the further discovery of petroleum and natural gas.

QUARRYING.

Regulations governing the leasing of Dominion lands containing limestone, granite, slate, marble, gypsum, marl, gravel, sand, or any building stone, were approved by Order in Council dated 13th May, 1910, and came into effect on the 15th of June, 1910. Under these regulations the maximum area which may be leased is 40 acres, the term of the lease being twenty-one years, renewable for a further term of twenty-one years, and the rental is at the rate of $1 per acre per annum.

The number of leases now in force which were issued under the provisions of these regulations is 439, distributed as follows: In Manitoba, 137 leases, containing an area of 4,518·50 acres; in Saskatchewan, fifty-six leases, containing an area of 2,833·19 acres; in Alberta, 172 leases, containing an area of 6,671·50 acres; in British Columbia, seventy-four leases, containing an area of 2,867 acres.

The total revenue collected during the fiscal year on account of quarrying leases, including the application fees, amounts to $12,611.88.

CLAY LEASES.

The quarrying regulations were amended by an Order in Council dated the 21st of November, 1912, authorizing the issue of leases for clay purposes, all such leases to provide for the operation of the location leased. Under this amendment, fifty-three leases have been issued up to date, comprising an area of 1,783·39 acres. Forty-two leases are now in force, comprising an area of 1,396·44 acres.

TAR-SAND.

The regulations established by Order in Council dated the 14th of February, 1910, authorizing the disposal of tar-sand rights within a certain area of land in the province of Alberta, adjacent to the Athabaska river, have been rescinded, and a number of the leases which were issued under the provisions of these regulations have been cancelled owing to failure to comply with the operating conditions thereof. There are still in existence, however, three tar-sand leases, comprising a total area of 3,960·20 acres.

WATER-RIGHTS.

There are now in force in the Yukon Territory, 471 grants to divert water for mining purposes, aggregating a total of 113,580 miner's inches. During the last fiscal year, seven water-rights were issued, comprising 1,100 miner's inches.

Grants are issued by this department authorizing the diversion of water in the Yukon Territory for power purposes. Up to date, thirteen grants have been issued, authorizing the diversion of 131,200 miner's inches of water. Four of these grants have been permitted to lapse, but the remaining nine, authorizing the diversion of 66,200 miner's inches of water, are in good standing. Three power plants have been installed, one of which is situated on the north fork of the Klondike river, and it appears that this plant is kept in operation during the winter, and the power generated is being used for heating and lighting purposes in the city of Dawson.

COAL MINING LANDS.

The total amount collected during the year on account of coal mining lands sold under the provisions of the late regulations was $326.29, which amount was on account of coal lands in the province of Alberta. The total amount collected on account of the sale of coal mining lands up to the 31st of March, 1915, was $2,091,673.74.

The statement lettered "D," at the end of this report, shows the revenue derived from the sale of coal lands for each fiscal year since 1896.

COAL LEASES.

The total number of coal mining leases in force at the close of the fiscal year was 737, including a total area of 441,264·17 acres, distributed as follows: In the province of Alberta, 651 leases, embracing an area of 429,517·38 acres; in the province of Saskatchewan, eighty-two leases, embracing an area of 10,818·19 acres; in the province of British Columbia, three leases, comprising an area of 888·60 acres; in the Yukon Territory, one lease, comprising an area of 40 acres.

The total number of leases of coal mining rights issued during the year was sixty-four, comprising an area of 56,908 acres. The total revenue received during the year for rental of coal mining rights was $135,848.98.

ROYALTY ON COAL.

The regulations under which coal mining rights were sold provided for the payment of a royalty of 10 cents per ton of 2,000 pounds on the output of the mine. This regulation came into force on the 6th of April, 1901, after which date all sales of coal mining rights were made subject to royalty. By an Order in Council dated the 16th of January, 1915, the royalty on coal mined from lands acquired under these regulations was reduced to seven cents per ton of 2,000 pounds in view of the conditions under which coal mining operations are being carried on.

Under the regulations governing the issue of leases to mine coal, the royalty is fixed at 5 cents per ton of 2,000 pounds on the merchantable output of the mine.

The following is a statement showing the amount collected on account of royalty on coal mined from lands in the western provinces and in the Yukon Territory, respectively, during each year since the regulations came into effect:—

Year.	Alberta.	Saskatchewan.	British Columbia.	Yukon.
	$ cts.	$ cts.	$ cts.	$ cts.
1901–2	Nil.	Nil.	Nil.	Nil.
1902–3	Nil.	Nil.	Nil.	Nil.
1903–4	56 90	Nil.	Nil.	2 40
1904–5	2,822 00	110 70	Nil.	47 00
1905–6	2,379 75	47 10	Nil.	569 33
1906–7	3,865 26	74 20	Nil.	517 34
1907–8	7,621 67	4 30	Nil.	1,543 38
1908–9	5,322 39	358 11	Nil.	371 73
1909–10	153,559 98	1,672 50	3 00	136 38
1910–11	218,932 88	2,184 74	3 50	125 00
1911–12	104,894 55	3,034 74	2 78	390 00
1912–13	142,997 79	3,145 72	6 95	1,069 11
1913–14	147,198 75	2,123 43	19 35	Nil.
1914–15	104,489 77	1,880 06	4 90	Nil.

By an Order in Council dated the 7th April, 1913, provision was made that owing to the scarcity of fuel in the Yukon Territory, no royalty shall be levied or collected on coal mined in that territory for a period of five years, that is, up to the 7th of April, 1918.

The total amount derived from coal mining lands on account of purchase price, rental, royalty and application fees, during the fiscal year, amounted to $248,022.

SAND, STONE AND GRAVEL PERMITS.

Regulations governing the issue of permits to remove sand, stone and gravel, the property of the Crown, from the beds of rivers and lakes in the western provinces, in the Northwest territories, and in the Railway Belt in the province of British Columbia, were established by Order in Council dated the 17th of January, 1910.

During the fiscal year eleven permits were issued under the provisions of these regulations, in connection with which dues and fees were paid amounting to $52.30.

The following is a statement of the office work performed during the year:—

Letters received and recorded	45,534
Letters sent	50,385
Pages of memoranda and schedule	9,428
Plans and sketches prepared	1,158
Accounts kept posted	20,931
Accounts rendered	11,780
Assignments accepted and registered	1,001
Returns examined and posted	2,112

Receipts issued	417
Refunds examined and prepared	959
New entries and renewals for mining locations granted in the western provinces and Territories, not including the Yukon	1,849
Applications for coal locations received	688
Applications for stone, gypsum and clay received	98
Applications for petroleum and natural gas received	10,349
Applications for quartz claims in Alberta, Saskatchewan, and Manitoba	1,497
Applications for placer mining claims in Alberta, Saskatchewan, and Manitoba	79
Applications for dredging leases	9
Applications for homestead entries in the Yukon	7
Applications to purchase or lease land in the Yukon	61
Homestead entries granted	7
Agricultural leases in force in the Yukon, comprising an area of 175.12 acres	24
Water-front leases in existence	16
Gold dredging leases issued	7
Coal mining leases issued covering an area of 56,908 acres	64
Quarrying leases issued covering an area of 1,683 acres	47
Clay leases issued covering an area of 27 acres	1
Petroleum and gas leases issued covering an area of 3,697,211 acres	9,832
Prospecting reservations made under section 18 of coal mining regulations embracing an area of 34,446 acres	17

I have the honour to be, sir,
Your obedient servant,

H. H. ROWATT,
Controller.

A.—Statement of Receipts on account of Coal and Minerals in the Provinces and Territories, also Timber, Hay, Coal, Hydraulic Mining, Dredging, Royalty on Gold, Mining Fees, Rental of Agricultural Lands, Water Power and Water Fronts, Office Fees and Sale of Dominion Lands in the Yukon for the fiscal year 1914 and 1915.

Month.	Quartz Acreage Sales.	Dominion Lands Sales.	Coal Sales.	Coal Mining.	Coal Royalty.	Coal Rental.	Rental Yukon.	Timber dues Yukon.	Mining Fees.	Hydraulic Leases.	Dredging Leases, N.W.T.
	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
April	419 43	32 00	.....	275 00	9,695 02	9,792 29	4,625 63	757 20	7,279 00	.....	.....
May	41 11	119 61	100 00	155 00	11,207 87	30,682 34	1,119 50	1,021 50	5,929 70	.....	.....
June	899 78	46 00	75 00	2,170 00	15,718 04	20,028 51	145 98	1,030 23	7,847 50	.....	200 00
July	103 30	10 00	33 54	1,015 00	3,792 15	21,129 53	12 50	386 50	8,144 50	.....	.....
August	542 67	71 08	.....	70 00	7,371 77	6,569 43	7 50	491 00	6,256 50	580 50	.....
September	147 27	.....	.....	545 00	9,706 67	5,582 50	447 10	2,126 10	8,059 50	515 48	.....
October	.....	225 92	76 34	215 00	2,657 62	9,029 22	186 54	2,178 13	8,312 25	375 00	.....
November	.....	151 30	11 08	665 00	8,406 22	12,716 09	40 68	777 50	5,022 50	1,008 00	.....
December	.....	307 65	20 03	210 00	17,081 29	5,103 90	15 00	899 50	9,226 00	375 00	.....
January	.....	90 42	10 00	50 00	5,171 89	11,268 42	.....	848 50	3,976 50	.....	.....
February	.....	15 00	.....	40 00	2,927 37	2,162 77	213 00	622 46	2,231 50	2,433 00	.....
March	81 35	52 27	0 30	62 00	12,638 82	1,783 98	368 19	658 50	3,520 50	.....	.....
	2,234 91	1,121 25	326 29	5,472 00	106,374 73	135,848 98	7,181 62	11,797 12	75,805 95	5,286 98	200 00

A.—Statement of Receipts on account of Coal and Minerals in the Provinces and Territories, etc.—*Concluded.*

Month.	Dredging Leases. Yukon.	Dredging Gold Export Tax.	Free Certificates Export of Gold.	Stone Quarry.	Map Sales, Office and Registration Fees.	Homestead Fees.	Hay Yukon.	Interim Receipt Account.	Tar-sands	Sand, Stone and Gravel.	Petroleum.	Total.
	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
April		589 74	3 00	1,401 05	53 00					1 50	18,692 39	53,616 25
May	246 35	4,375 52	4 50	2,282 22	32 50	10 00	20 00	250 00		0 50	295,757 15	353,355 37
June	3,000 00	25,351 81	14 50	1,565 57	198 50		17 00	150 00	960 00		481,088 41	560,506 83
July		16,900 27	11 00	2,085 49	59 75		5 00	10 00	912 60		250,156 68	304,767 81
August		18,546 81	14 00	818 03	63 00		5 00				29,729 73	71,137 02
September	156 84	23,529 26	34 50	1,130 95	18 00	30 00					3,646 70	55,675 87
October	20 00	23,762 08	16 50	386 60	29 00	10 00					9,736 83	57,217 03
November		1,615 51	3 00	553 53	12 50	10 00					13,954 06	44,946 97
December		1,287 56	3 00	1,315 00	149 50	10 00				25 30	1,360 92	37,389 65
January	230 00	195 26	1 50	154 47	77 50	10 00				24 00	2,109 89	24,218 35
February	1,744 30	0 15	1 00	288 02	44 00	10 00					4,377 95	17,110 52
March		87 07	0 50	630 95	55 00			605 37		1 00	3,728 13	24,273 93
	5,397 49	116,241 04	107 00	12,611 88	792 25	90 00	47 00	1,015 37	1,872 60	52 30	111,433 84	1,604,215 60

H. H. ROWATT,
Controller.

Certified correct,
W. P. Batterton,
Accountant, M. L. and Y. Branch.

B.—STATEMENT showing the total amount of Revenue collected at each Agency, including the Yukon Territory, for the Fiscal Year ending March 31, 1915. Revenue received at Head Office on account of the sale of coal lands in the Western Provinces, is in the statement, credited to the several agencies in which the lands are situated.

Agency.	Quartz Acreage Sales.	Dominion Lands Sales.	Coal Sales.	Coal Mining.	Coal Royalty.	Coal Rental.	Rental Yukon.	Timber dues Yukon.	Mining Fees.	Hydraulic Leases.	Dredging Leases, N.W.T.
	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
Arctic						5 00			75 00		
Battleford				5 00					5 00		
Calgary			100 30	1,275 00	7,541 25	30,570 87			558 00		
Dauphin									609 00		
Edmonton				1,090 00	9,389 25	13,633 39			2,600 00		
Estevan				75 00	1,321 89	1,568 36					
Grand Prairie				10 00	7 00	85 00			5 00		200 00
Humboldt									5 00		
Kamloops				15 00							
Lethbridge			225 99	530 00	3,542 36	3,804 66			60 00		
Maple Creek				92 00	55 90	120 30					
Medicine Hat				1,085 00	357 15	391 51			247 50		
Moosejaw				150 00	157 45	364 72					
New Westminster				55 00							
Peace River				40 00					24 00		
Prince Albert									5,851 20		
Red Deer				305 00	2,626 25	2,615 58			42 00		
Regina				10 00							
Revelstoke											
Saskatoon				670 00		45 00			79 00		
Swift Current				15 00	92 60	40 00					
Weyburn				25 00	87 42	85 00					
Winnipeg	523 31			10 00					4,682 00		
Ottawa				15 00	81,196 21	82,479 22			22 50		
Dawson, Gold Commissioners' Office									49,401 25	5,286 98	
Duncan, Mining Recorder's Office									3,540 00		
Sixty Mile, Mining Recorder's Office									4,900 00		
Dawson, Royalty Collector's Office											
Dawson, Crown Timber Office								10,971 37			

Dawson, Comptroller's Office						40 37	4,009 95				
Dawson, Dominion Lands Office		858 19									
Dawson, Mining Recorder's Office	998 52										
Whitehorse, Asst. Gold Comm'r. Office									1,271 00		
Conrad, Mining Recorder's Office	302 06								447 50		
Kluane, Mining Recorder's Office								825 75	1,381 00		
Whitehorse, Crown Timber Office											
Whitehorse, Comptroller's Office											
Whitehorse, Royalty Collector's Office							3,171 67				
Whitehorse, Dominion Lands Office		263 06									
Whitehorse, Mining Recorder's Office	411 02										
	2,234 91	1,121 25	326 29	5,472 00	106,374 73	135,848 98	7,181 62	11,797 12	75,805 95	5,286 98	200 00

B.—Statement showing the total amount of Revenue collected at each Agency, including the Yukon Territory, &c.—*Concluded.*

Agency.	Dredging Leases Yukon.	Gold Export Tax.	Free Certificates Export of Gold.	Stone Quarry.	Map Sales, Office and Registration Fees.	Homestead Fees.	Hay, Yukon.	Interim Receipt Account.	Tar-Sands	Sand, Stone and Gravel.	Petroleum.	Total
	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
Arctic												80 00
Battleford				11 68							5,382 29	5,403 97
Calgary				209 32	4 00					0 50	223,632 86	263,892 10
Dauphin				215 00							3,008 00	3,832 00
Edmonton				2,382 83	84 00				1,872 60	51 30	221,259 64	255,363 01
Estevan											3,285 00	6,250 25
Grand Prairie				61 80								368 80
Humboldt											140 65	1,408 65
Kamloops				431 65						0 50	40 00	487 15
Lethbridge				271 60	2 00						241,389 30	249,825 91
Maple Creek				190 00							33,908 55	34,366 75
Medicine Hat				5 00							82,239 16	84,325 32
Moosejaw				375 00							5,287 38	6,334 55
New Westminster				642 17							21,524 78	22,221 95
Peace River				184 00							8,402 55	8,650 55
Prince Albert				55 00	155 00						7,663 90	13,725 10
Red Deer					72 00						205,559 28	211,220 11
Regina											404 50	414 50
Revelstoke				140 55							653 88	794 43
Saskatoon					20 00						13,028 51	13,842 51
Swift Current				35 00							2,561 35	2,746 95
Weyburn				5 00							4,302 00	4,504 42
Winnipeg				2,648 78	308 50						695 10	8,867 69
Ottawa				4,747 50							25,704 16	191,161 59
Dawson, Gold Commissioner's Office	5,397 49							1,015 37				61,101 09
Duncan, Mining Recorder's Office												3,510 00
Sixty Mile, Mining Recorder's Office												4,900 00
Dawson, Royalty Collector's Office		115,890 11										115,890 11

Dawson, Crown Timber Office							47 00					11,018 37
Dawson, Comptroller's Office			87 50									87 50
Dawson, Dominion Lands Office					97 75	60 00						5,066 26
Dawson, Mining Recorder's Office												998 52
Whitehorse, Asst. Gold Commissioner's Office												1,271 00
Conrad, Mining Recorder's Office												749 56
Kluane, Mining Recorder's Office												1,381 00
Whitehorse, Crown Timber Office												825 75
Whitehorse, Comptroller's Office			19 50									19 50
Whitehorse, Royalty Collector's Office		350 93										350 93
Whitehorse, Dominion Lands Office					49 00	30 00						3,513 73
Whitehorse, Mining Recorder's Office												411 02
	5,397 49	116,241 04	107 00	12,611 88	792 25	90 00	47 00	1,015 37	1,872 60	52 30	1,114,338 84	1,604,215 60

H. H. ROWATT,
Controller.

Certified correct,
W. P. BATTERTON,
Accountant, M. L. and Y. Branch.

C.—Statement of Receipts from Timber, Hay, Coal, Hydraulic Mining, Dredging, Royalty on Gold, Mining Fees, Rental of Agricultural Lands, Water Fronts and Water-power, Office Fees and the sale of Dominion Lands for the fiscal year 1914 and 1915.

Month.	Quartz Acreage Sales.	Dominion Lands Sales.	Coal Rental.	Rental Yukon.	Timber Dues Yukon.	Mining Fees.	Hydraulic Leases.	Dredging Leases, Yukon.
	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
April	47 03	32 00	.....	4,625 63	757 20	4,684 00	.....	.....
May	41 11	119 01	.....	1,119 50	1,021 50	4,648 00	.....	246 35
June	798 14	46 00	.....	145 98	1,030 23	4,172 50	.....	3,000 00
July	103 30	10 00	.....	12 50	386 50	6,177 00	.....	.....
August	542 67	71 08	.....	7 50	491 00	4,717 50	580 50	.....
September	98 00	.....	.....	447 10	2,126 10	7,524 50	515 48	156 84
October	.....	225 92	.....	186 51	2,178 13	7,530 25	375 00	20 00
November	.....	151 30	.....	40 68	777 50	4,832 50	1,008 00	.....
December	.....	307 65	.....	15 00	899 50	8,866 50	375 00	.....
January	.....	90 42	.....	.....	848 50	3,386 50	.....	230 00
February	.....	15 00	40 37	213 00	622 46	1,736 00	2,433 00	1,744 30
March	81 35	52 27	.....	368 19	658 50	2,665 50	.....	.....
	1,711 60	1,121 25	40 37	7,181 62	11,797 12	60,940 75	5,286 98	5,397 49

Month.	Gold Export Tax.	Free Certificates Export of Gold.	Map Sales, Office and Registration Fees.	Homestead Fees.	Hay Yukon.	Interim Receipt Account.	Total.
	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
April	589 74	3 00	9 50				10,748 10
May	4,375 52	4 50	7 00	10 00	20 00	250 00	11,863 09
June	25,351 81	14 50	80 00		17 00	150 00	34,806 16
July	16,900 27	11 00	18 25		5 00	10 00	23,633 82
August	18,546 81	14 00	20 00		5 00		24,996 06
September	23,529 26	34 50	5 00	30 00			34,466 78
October	23,762 08	16 50		10 00			34,304 42
November	1,615 51	3 00		10 00			8,438 49
December	1,287 56	3 00		10 00			11,764 21
January	195 26	1 50		10 00			4,762 18
February	0 15	1 00	2 00	10 00			6,817 28
March	87 07	0 50	5 00			605 37	4,523 75
	116,241 04	107 00	146 75	90 00	47 00	1,015 37	211,124 34

H. H. ROWATT,
Controller.

Certified correct,
W. P. BATTERTON,
Accountant, M. L. and Y. Branch.

D.—Statement showing the total Revenue derived from the sale of Coal Land for each fiscal year since 1896.

1896-1897	$ 75 76
1897-1898	1,883 74
1898-1899	350 00
1899-1900	5,650 33
1900-1901	101,772 00
1901-1902	16,270 32
1902-1903	31,055 38
1903-1904	68,949 75
1904-1905	35,695 00
1905-1906	125,754 12
For the nine months ending March 31, 1907	335,795 97
1907-1908	346,813 23
1908-1909	276,186 86
1909-1910	377,445 86
1910-1911	191,257 23
1911-1912	11,861 66
1912-1913	1,889 52
1913-1914	5,529 55
1914-1915	326 29

H. H. ROWATT,

Controller.

Certified correct,
W. P. Batterton,
Accountant, M. L. and Y. Branch.

E. Statement showing the Total Gold Production, the total subject to Royalty and the total Royalty collected for each fiscal year from May 1, 1898, to March 31, 1913.

Fiscal Year.	Gold Production.	Subject to Royalty.	Royalty Collected.	Total Revenue.
	$ cts.	$ cts.	$ cts.	$ cts.
1897-1898	3,072,773 20	2,732,928 20	273,292 82	273,292 82
1898-1899	7,582,283 02	5,882,626 00	588,262 37	589,943,52
1899-1900	9,809,464 64	7,307,720 00	730,771 99	733,041 04
1900-1901	9,162,082 79	7,234,416 17	592,660 98	596,368 03
1901-1902	9,566,340 52	8,367,225 88	331,436 79	331,532 04
1902-1903	12,113,015 34	12,113,015 34	302,893 48	302,893 48
1903-1904	10,790,663 12	10,790,663 12	272,217 96	272,217 96
1904-1905	8,222,053 91	8,222,053 91	206,760 87	206,760 87
1905-1906	6,540,007 09	6,540,007 09	163,963 25	163,963 25
1906-1907	3,304,791 05	3,304,791 05	82,622 42	82,622 42
1907-1908	2,820,161 60	2,820,161 60	70,504 65	70,504 65
1908-1909	3,260 282 80	3,260,282 80	81,507 07	81,507 07
1909-1910	3,594,251 20	3,594,251 20	89,844 10	89,844 10
1910-1911	4,126,727 60	4,126,727 60	103,168 19	103,168 19
1911-12	4,024,236 75	4,024,236 75	100,606 29	100,606 29
1912-13	5,018,411 85	5,018,411 85	125,460 52	125,460 52
1913-1914	5,301,507 60	5,301,507 60	132,537 69	132,537 69
1914-1915	4,649,634 40	4,649,634 40	116,241 04	116,241 04
Total	112,958,688 48	105,290,660 56	4,364,752 48	4,372,504 98

H. H. ROWATT,

Controller.

Certified correct,
W. P. Batterton,
Accountant, M. L. and Y. Branch.

No. 29a.

DAWSON, April 22, 1915.

SIR,—I have the honour to submit my annual report as Commissioner of the Yukon Territory for the fiscal year ending March 31, 1915:—

GOLD PRODUCTION.

The amount of gold mined on which royalty was paid was 309,975·62 ounces, valued at $15 per ounce, being $4,649,643.40, $15 per ounce being the value placed on gold for the purpose of calculating the royalty. This is a decrease in the output of gold in comparison to the amount mined during the previous year, which decrease is accounted for by the shortening of the operating season. The Northern Light, Power and Coal Company's plant at Coal Creek having been temporarily closed down, power was not obtainable for the dredges late in the fall. A further reason for the decrease in the output was due to the sinking of one of the largest dredges in the country early in October, too late to be put in operation again during the season.

Gold produced was chiefly from the dredging and hydraulic operations, carried on by the Yukon Gold Company, Canadian Klondyke Mining Company, and Walkers Fork Gold Dredging Company. A detailed report of the works of these companies, together with those of other mining companies and individuals operating in Yukon, will be found in the report of the gold commissioner forwarded herewith.

QUARTZ MINING.

Owing to conditions brought about by the war, the Atlas Mining Company, which was developing and at the same time shipping copper from the Pueblo mine at Whitehorse, was obliged to close down. Negotiations are now in progress which will probably result in the work being opened up again at an early date. The work done so far has demonstrated the existence of a large body of ore. As yet nothing has been done below the 400-foot level, but the indications are that the values will increase with depth.

Some prospecting has been done on a small scale in the Dawson district on properties at Bear creek and Bonanza creek where good surface prospects in free milling ore have been found.

The most promising quartz prospect in the territory at the present time is a silver-lead property at Galena creek, in the Upper Stewart district. The ore has proved of sufficient richness right from the surface to make it profitable to ship for treatment at the smelter at Trail, B.C. Development work is proceeding on this claim, and a number of surface showings of similar ore have been found in the same locality on which prospecting is being done.

LEGISLATION.

The Ordinance passed at the 1914 session of the Yukon Council incorporating the city of Dawson was, after a plebiscite, brought into force by proclamation, and the government of the city of Dawson is now carried on by a council consisting of the commissioner and the four members of the Yukon Council representing the districts of North and South Dawson.

At the session of Yukon Council commencing March 30, 1915, only a small amount of new legislation was enacted. The consolidation of the Ordinances for the

territory having been completed, and the Consolidated Ordinances brought into force on the first of this month, it was found that not much legislation was required, a special effort having been made during the two preceding years to get the legislation of the territory in shape, having in view the consolidation of the Ordinances.

Provision was made for maintenance and repairs of roads, bridges, and public works and the extension of the road system to the outlying mining districts.

PUBLIC WORKS.

Ferries were established on the overland road between Dawson and Whitehorse at the crossings of Yukon, Pelly, and Stewart rivers, and considerable mileage added to the graded portions of that road, and included in which is an entirely new road between Minto and Pelly posts, eliminating what has always been a most dangerous portion of the road following along rock bluffs overhanging the Yukon river. This road is now in such good condition, with this danger eliminated and ferries installed, that at no season of the year is there any necessity for a delay in the transportation of any portion of the mail from Whitehorse to Dawson. In the past it has been the custom to leave large quantities of mail at Whitehorse in the fall, to remain there until the opening of navigation in the spring, and more recently to allow large quantities to accumulate at Whitehorse to be moved out gradually during the winter on sleighs. Under present conditions the mail can be handled without danger as fast as it arrives.

The road from Dawson up the Klondike river to the Upper Stewart mining district was extended as a summer road to the mouth of Flat creek, a distance of 40 miles from Dawson, and from that point a good winter road was established over which was all the traffic between the Stewart River district and Dawson during the past winter. This winter road is a great improvement on the old road, which was longer and crossed several ranges of hills. By degrees this road will be improved and made suitable for summer use.

PUBLIC BUILDINGS.

The necessary repairs were made to all government buildings in the territory. An assay office building was erected at Whitehorse by an appropriation made by the Yukon Council for that purpose, and the work of the office is now conducted therein.

The public schools throughout the territory have been maintained at their former high standard of efficiency. The average attendance at the Dawson school for the past two years has been increased. Several assisted schools were maintained at points in the territory where children of school age were living.

ADMINISTRATION OF JUSTICE.

The territory has been remarkably free from crime, one murder case being the only serious criminal offence recorded. The crime in question took place at Whitehorse. The murderer was apprehended, tried and found guilty and sentenced to death. The sentence having been commuted, the accused was shot and killed in an attempt to escape from prison.

The numerical strength of the Royal Northwest Mounted Police has been sufficient to adequately police the territory.

I transmit herewith reports from the comptroller, gold commissioner, and crown timber and land agent.

I have the honour to be, sir,

Your obedient servant.

GEORGE BLACK,
Commissioner.

No. 29b.

DAWSON, Y.T., April 10, 1915.

SIR,—I have the honour to submit herewith my report for the fiscal year ending March 31, 1915, accompanied by the following statements:—

1. A financial statement, in duplicate, showing the receipts in the Gold Commissioner's office during the said year, and also receipts in the offices of the Mining Recorders for the Duncan and Sixtymile districts.

2. A financial statement of the receipts in the Gold Commissioner's office for the fiscal year, being a recapitulation.

3. A comparative statement, in duplicate, of the receipts for the fiscal years ending March 31, 1914, and March 31, 1915.

The comparative statement referred to shows an increased revenue of $6,533.41 over that for the year ending March 31, 1914, and also shows an increase over that for the year ending March 31, 1913.

Mining operations in the various mining districts of the territory have been the subject matter of reports from the various mining recorders, agents to the mining recorder, and the mining inspector, for the year which ended on the 1st of November last. Duplicate copies of these reports have been forwarded to the Department of the Interior from time to time, and the originals are on file for your information.

The Yukon Gold Company still hold the leading position as placer mining operators in the Dawson Mining district, having operated to their full capacity their dredges and hydraulic plants during the year. Their eight dredges, all electrically driven, were operated during the dredging season, averaging 147 days, as follows:—

No.	Make.	Capacity of Buckets.	Location.
1	Bucyrus	5 cubic feet	90 to 95 below Bonanza.
2	"	5 "	48 to 45 "
3	"	5 "	69 to 64 "
5	"	7 "	12 to 6 "
8	"	7 "	18 to 24-B above ¾
4	Marion	7 "	41 to 44 below Hunker Creek.
6	Bucyrus	7 "	12 to 14 Gold Run Creek.
9	"	7 "	17 to 21 Eldorado Creek.

The average number of men employed operating these dredges and the steam-thawing plants in connection therewith, was 400, a total yardage of approximately 4,800,000 cubic yards of material having been dredged.

The hydraulic operations of this company were also on their usual extensive scale, the supply of water being exceptionally good throughout the entire season. An average of eighty-five men were employed in these operations, which were carried on in the following places: Adams Hill, Bunker Hill, Trail Gulch, Monte Cristo Gulch, American Gulch, King Soloman Hill, Magnet Gulch, American Hill, Lovett Gulch, and Fox Gulch.

In addition to the men employed in dredging and hydraulicing, a considerable force was employed in prospecting, in the machine shops, in the power plant at Twelve-mile, and in connection with the extensive system of ditches and flumes maintained by the company.

The Canadian Klondike Mining Company operated their four dredges throughout the dredging season as follows:—

Name.	Capacity of Buckets.	Location.
Canadian No. 1	7½ cubic feet	Upper Hunker creek.
" 2	17 "	Hydraulic lease No. 18 and dredging lease No. 24.
" 3	17 "	Placer claims below Maris' Discovery on the Klondike river and on dredging lease No. 23.
" 4	17 "	Hydraulic lease No. 18.

Owing to the fact that the gravels in the Klondike valley are, generally speaking, unfrozen, and to the fact that the water supply is adequate, the dredging season in this valley is longer than on the creeks where thawing operations are necessary, and where the water supply is limited in the early spring and the late fall.

Dredges Canadian Nos. 3 and 4 operated an average of 270 days. Dredge Canadian No. 2, through an unfortunate accident, was sunk in the Klondike river in the early part of September, and it was not possible to get this dredge in operation again last year.

An average of 300 men were employed in connection with these dredging operations, and 6,867,150 cubic yards of material were dredged. A considerable force of men was kept employed by this company in prospecting with Keystone drills, in their machine shops, in ditch construction and in other ways incidental to such extensive operations.

The Northwestern Corporation, Limited, which is the operating company for what are known as the Treadgold Companies, namely, the Dominion Mining Company, the Big Creek Mining Company, and the Calder Mining Company, carried on extensive ground sluicing operations and completed their system of ditches used in connection with their work.

On the Dominion Mining Company's ground, between Nos. 33 and 94 below Lower Discovery on Dominion creek, an average of thirty-five men were employed, and 382,399 cubic yards of material ground sluiced.

On the Big Creek Mining Company's ground, between Nos. 239 and 300 below Lower Discovery on Dominion creek, an average of forty-two men were employed, and 677,473 cubic yards of material ground sluiced.

On the Calder Mining Company's ground between Nos. 30 and 42 below A. Mack's discovery on Quartz creek, an average of thirty-two men were employed, and 484,269 cubic yards of material removed.

These ground sluicing operations were for the purpose of removing all overburden of muck preparatory to mining the ground by dredging or other mechanical devices.

An excavator of a type not yet given a trial in this country was examined in England last year and reported on favourably by the experts for this company. One of these machines was being prepared for shipment when the outbreak of the war made it impossible to secure transportation. The representative of the company in Dawson informs me, however, that the shipment is to leave England during the present month, so as to reach here soon after the opening of navigation. It is hoped to have the machine set up this year, and, if found satisfactory, will be followed by others of the same type.

The creeks in the Dawson Mining district, tributaries of the Klondike and Indian rivers, are now in the main controlled by the companies referred to, although profitable individual operations are still being carried particularly on Hunker and Sulphur creeks. Eureka creek, one of the earliest creeks to be mined in the district, is still a profitable field for the individual operator.

On Clear, Black Hills, Scroggie, and Barker creeks, all tributaries to the Lower Stewart river, about the same number of men were engaged as last year.

Ten-mile creek, a tributary of the Sixty-mile river, is now being worked at a profit. Some of the claims showing excellent pay.

Kirkman creek, a tributary of the Yukon, was stampeded last summer and, from the best information available, it would appear that this creek can be profitably mined.

Nansen creek and tributaries are gradually coming to the front as producing creeks. On Discovery Pup, Rusk creek, East Fork, and Back creek, pay has been located, and the miners in that portion of the district are very sanguine over the outlook.

In the Sixty-mile Mining district more men were employed in individual mining operations than last year. Considerable prospecting was done on Sixty-mile creek, between Miller and Boucher creeks, but not sufficient work has been done to determine whether this portion of the creek can be profitably mined.

The Milvain dredge operated successfully throughout the season on the Miller Creek concession, owned by the North American Transportation and Trading Company.

Placer mining in the Duncan Mining district was on a more extensive scale than in any former year. Highet creek continues to be the banner creek. While Dublin, Duncan, and Haggart creeks are now steady producers. Messrs. Scougale and Kastner, who own a group of claims on Minto creek, have just completed, at heavy expense, an extensive system of ditches and flumes, and are now in a position to open up their ground.

QUARTZ MINING.

The number of mineral claims now held in the Dawson Mining district is 787, but with a few exceptions nothing further than the annual representation work was performed.

The "Lone Star" continued development work on their property on Victoria gulch, having operated their four-stamp mill for a part of the year. Mr. E. H. Searle, the manager, informs me that the company is satisfied that the development work done justifies further expenditure, and that an effort will be made to secure the additional capital necessary for further development.

The Bear Creek Mining Company continued development work on their property on Bear creek on quite an extensive scale. The small trial mill erected on the property, having a capacity of four tons in twenty-four hours, was operated throughout the summer. The management feel very hopeful over the outlook, and an effort is being made to secure the necessary capital to install a larger mill.

Other properties on which considerable development work was done are the "Box Car" claims at the head of Bonanza creek, and the "Red Hill" mineral claim on Gold Run creek, a tunnel 70 feet in length having been driven on the latter property, and very satisfactory results secured.

The outlook for lode mining in the Duncan Mining district is most encouraging. Development work was continued throughout the year on the various quartz mining claims on Dublin gulch, with encouraging results.

The "Silver Lead" properties on Galena creek have attracted a great deal of attention, some eighty-five claims having been located in this vicinity. Mr. Harry McWhorter, the discoverer, has performed a large amount of development work on his claim the "Silver King." The main shaft on this property is now at a depth of

over 150 feet. Fifty-nine tons of ore from this mine were shipped to the smelter at Trail, B.C., last summer, the smelter returns from which gave an average of $269.90 per ton. Ten men have been employed during the past winter in mining further ore for shipment, over 1,000 tons having been hauled to Mayo for shipment to the smelter on the opening of navigation. Samples of the ore now being mined have been assayed by Mr. W. S. Sime, territorial assayer, and it continues to show remarkable values. Although the owner of this property still speaks of it as a prospect only, the outlook is certainly most encouraging.

Your obedient servant,

G. B. MACKENZIE,
Gold Commissioner.

FINANCIAL STATEMENT of the Gold Commissioner's Office from 1st April, 1914, to 31st March, 1915, Dawson, Y.T.

RECEIPTS.

Placer—		
Grants	$ 6,870 00	
Relocations	2,460 00	
Renewals	34,822 50	
Registered documents	2,157 00	
Abstracts	533 50	
		$46,843 00
Quartz—		
Records	$ 390 00	
Certificate of work	1,207 50	
Certificate of partnership	15 00	
Certificate of improvement	40 00	
Registered document	275 00	
Lieu of assessment	500 00	
Acerage and Crown grants	1,083 52	
Abstracts	5 75	
		3,516 77
Sundry Accounts—		
Water rights	$ 125 00	
Hydraulics	1,470 98	
Dredging	5,167 49	
		6,763 47
Duncan—		
Placer grants	$ 170 00	
" relocations	90 00	
" renewals	2,185 00	
" registered documents	201 00	
" abstracts	34 00	
Quartz records	455 00	
" certificate of work	270 00	
" certificate of partnership	17 50	
" registered documents	105 00	
" abstracts	2 50	
" water rights	10 00	
		3,540 00
Sixty-mile—		
Placer grants	$ 1,900 00	
" relocations	430 00	
" renewals	2,227 50	
" registered documents	319 00	
" abstracts	23 50	
		4,900 00
		$65,563 24
Disbursements—		
Comptroller	$ 65,563 24	
	$65,563 24	$65,563 24

Certified correct.

FRANK BROCK,
Accountant.

COMPARATIVE STATEMENT.—Returns, Gold Commissioner's Office, Dawson, Y.T.

——	Year ending March 31, .1914.	Year ending March 31, 1915.	Increase 1915.	Decrease. 1915.
Placer grants	5,110	8,940	3,830	
Placer renewals	42,800	39,235		3,565
Placer relocations	2,270	2,980	710	
Placer registered documents	3,778	2,677		1,101
Placer abstracts	7·50	591	583·50	
Water rights	140	135		5
Hydraulics	1,105·50	1,470·98	365·48	
Dredging	342·46	5·167·49	4,825·03	
Quartz records	695	845	150	
Quartz registered documents	564	380		184
Quartz certificate of work	1,422·50	1,477·50	55	
Quartz certificate of partnership	27·50	32·50	5	
Quartz certificate of improvement	35·00	40·00	5	
Quartz lieu of assessment	100	500	400	
Quartz acreage and Crown grants	619·37	1,083·52	464·15	
Quartz abstracts	13·00	8·25		4·75
	59·029·83	65,563·24	11,393·16	4,859·5
			Net increase—$6,533.41	

FINANCIAL STATEMENT, Gold Commissioner's Office, year ending March 31, 1915.

RECAPITULATION.

	Placer Grant.	Renewal Grant.	Re-location Grant.	Registration document, Placer.	Abstract, Placer.	Water Rights.	Hydraulics.	Dredging.	Quartz Records.	Certificate of work.	Certificate of Partnership.	Certificate of Improvements.	Registration document Quartz.	Lieu of Assessment.	Acreage.	Abstracts, Quartz.
	$	$ cts.	$	$	$ cts.	$	$ cts.	$ cts.	$	$ cts.	$ cts.	$	$	$	$ cts.	$ cts
Dawson	6,870	34,822 50	2,460	2,157	533 50	125	1,470 98	5,167 49	390	1,207 50	0 15	40	275	500	1,083 52	5 75
Duncan	170	2,185 00	90	201	34 00	10	.....	.....	455	270 00	17 50	.....	105	.....	.....	2 50
Sixty-mile	1,900	2,227 50	430	319	23 50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Totals	8,940	39,235 00	2,980	2,677	591 00	135	1,470 98	5,167 49	845	1,477 50	32 50	40	380	500	1,083 52	8 25

Certified correct.

FRANK BROCK,
Accountant.

No. 29c.

WHITEHORSE, Y.T., May 14, 1915.

SIR,—I beg to submit the following report respecting the Whitehorse Dominion Lands district, which comprises the Whitehorse, Conrad, and Kluane Mining districts, or practically the whole of southern Yukon, for the year ending March 31, 1915:—

The quartz mining activities of the district have unfortunately been nil for the past several months. The Atlas Mining Company began active operations on their group of "Pueblo" claims 6 miles west of Whitehorse, in April last, and these were continued vigorously up to the middle of September, when the uncertainty created by the European war induced the management to cease operations. During the interval a good deal of valuable work had been done. The main shaft was sunk an additional 80 feet, making the total depth of 445 feet, a raise of 59 feet was put up from the 400-foot level and a total of about 1,000 feet of drifting and cross-cutting was done on the same level. Every foot of this work was most encouraging, as will be seen when it is stated that from this development work alone over twenty-one thousand tons of ore was shipped between April 28 and September 14, just four and one-half months. This ore was shipped to the Tacoma smelter, and fully maintained the quality of former shipments from the higher levels. It was also proved that the large surface showing was fully maintained with depth. Unfortunately the outbreak of the European war caused such uncertainty in the copper market that the management did not feel justified in continuing, and the mine was virtually closed down in September, after which the pumps were withdrawn and the mine is now full of water. This was an additional misfortune, owing to the fact that the past winter was the mildest that has ever been known here, and no doubt much valuable development could have been continued throughout it. At the time hostilities began a contract had been let to sink the main shaft to 600 feet, and this work could undoubtedly have been economically carried on throughout the most severe weather experienced. The management have hopes that the mine will re-open at an early date, certainly at the close of the war, and possibly before that much desired event.

The Atlas Mining Company also had a hand-drill gang for several months sinking and drifting under option on the "War Eagle" claim, a property situated about a mile and one-half northeast of the "Pueblo." A shaft 100 feet deep had been sunk here, and drifts aggregating 150 feet run in various directions on the 50- and 100-foot levels. The prospects were most encouraging, rich ore in large quantity being proved. This work, too, had to be abandoned early in the year. It is hoped it will be resumed as soon as normal conditions return.

Beyond this there was, during the year, practically no work in connection with quartz claims further than the performance of annual assessments upon claims not patented, a good many of which still exist.

The placer operations of the district have not developed any particularly striking features. Livingstone creek and the Kluane district have gone on in the usual way, and with about the same output as in the previous year. There is, however, a good deal more prospecting of a fairly efficient character being done than for several seasons past, which it is hoped will produce some discoveries of value. This prospecting may be said to cover the Teslin, Nisutlin, and Nisling countries, besides several points in the Kluane district, where intelligent efforts are being made to get down to bedrock in the deeper gravels. As heretofore, however, the great difficulty in this is

the presence of unfrozen ground, accompanied by as yet uncontrollable quantities of water. A petition from the miners of Fourth of July creek for the use of one of the Government Empire drills was filed with the commissioner last winter, but owing to the lack of an appropriation the matter had to be deferred. Most of the miners of the district are convinced that if a drill could be intelligently operated on this creek for a few months the result would amply justify the expenditure.

Four homesteads were applied for and granted during the year. There were also several small tracts of land sold, mainly in the form of fox ranches. The business of fox and other fur propagation is becoming quite an important one in the district. I have made pretty careful inquiry and find that there are already some twenty ranches now engaged in the breeding of foxes and mink, mainly the former, and believe that the prospects for success are excellent in several cases. There can be little question that should the fur market resume the activity and importance of the past several years that the Yukon will take its place as one of the first among the domestic producers. The supply of fresh stock is not only comparatively cheap, but it is practically unlimited, and the climate should be ideal.

Already in the Whitehorse district alone there are at least sixty-one silver and black foxes, and 258 cross foxes being bred in captivity, and most of the breeding places are fitted off with pens of the most approved pattern, and are being conducted according to the most approved methods.

Tables Nos. 1, 2, and 3, attached, show the revenue from all sources collected during the year in the Whitehorse, Conrad and Kluane offices respectively.

Your obedient servant,

R. C. MILLER,

Assistant Gold Commissioner.

TABLE 1.—STATEMENT showing the Collections made in the Office of the Assistant Gold Commissioner, and of the Crown Timber and Dominion Lands Agent, Whitehorse, Y.T., during the fiscal year, 1914-15.

Month.	Mining Dues.										Timber and Land Dues.			Gold export Tax.			Total. 1914-15.	Total. 1913-14.
	Placer.			Quartz.														
	Grants.	Re-locations.	Renewable.	Registered documents.	Grants.	Certificate of work.	Certificate of partnership.	Payment in Lieu.	Registered documents.	Acreage and Crown Grants	Dominion Lands Receipts.	Timber.	Homesteads.	Royalty.	Free gold.	Game licenses.		
	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts
April					5 00	2 50			7 50	52 03	2,355 00						2,422 03	700 00
May					30 00	30 00			22 50		144 21	115 00					341 71	3,483 47
June			60 00		20 00	35 00		100 00	12 50	56 26		5 00		23 63	1 00		313 39	853 08
July			70 00	4 00		47 50					10 00			72 06	5 00	100 00	308 56	612 21
August		20 00	30 00	4 00	10 00				5 00	72 96	71 08	10 00		51 45	1 00	900 00	1,175 49	1,443 79
September		10 00	230 00	36 00	5 00	515 00		300 00			367 25	205 00	20 00	50 13	3 50		1,241 88	225 29
October			20 00	6 00		7 50						129 25		84 80	6 00		253 55	1,473 62
November					5 00						57 50	300 00	10 00	50	3 00		376 00	295 71
December		10 00	20 00	4 00		2 50			2 50			15 00		37 57			91 57	247 50
January						17 50					5 00	37 00		20 63			80 63	199 44
February			50 00	2 00							17 00	5 00					74 00	45 00
March			10 00			2 50					411 69	4 00		10 16			438 35	119 41
Total		40 00	490 00	56 00	75 00	160 00		400 00	50 00	181 25	3,438 73	825 75	30 00	350 93	1,950	1000 00	7,117 16	9,698 52
Number of receipts		4	37	14	15	64		4	16	8	14	24	3	33	28	10	271	536

TABLE No. 2.—STATEMENT showing the collections made in the office of the Mining Recorder for the Conrad District during the fiscal year ending March 31, 1915.

Month.	Quartz, Mining Dues.						Totals.	
	Certificate of Work.	Certificate of Partnership.	Payment in Lieu.	Registered Documents.	Acreage and Crown Grants	Grants.	1914-15.	1913-14.
	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
April						10 00	10 00	10 00
May	10 00			25 00		15 00	50 00	10 00
June	2 50						2 50	33 50
July	15 00			37 50	302 06	5 00	359 56	70 00
August	60 00		100 00			15 00	175 00	142 50
September	7 50			17 50			25 00	35 00
October				2 50			2 50	5 00
November	2 50		100 00				102 50	102 50
December								5 00
January	2 50						2 50	2 50
February	5 00						5 00	2 50
March	2 50						2 50	25 00
Totals	107 50		200 00	82 50	302 06	45 00	737 06	443 50
Receipts	43		2	33	12	9	99	93

TABLE No. 3.—STATEMENT showing the collections made in the office of the Mining Recorder for the Kluane District during the fiscal year ending March 31, 1915.

Month.	Placer Mining Dues.				Quartz, Mining Dues.					Totals.	
	Grants.	Relocations.	Renewals.	Registered Documents.	Grants.	Certificate of Work.	Certificate of Partnership.	Payment in Lieu."	Registered Documents.	1914-15.	1913-14.
	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$$ cts	$ cts.	$ cts.	$ cts.	$ cts.
April		90 00	100 00	12 00					5 00	207 00	62 00
May		30 00	40 00			5 00				75 00	120 00
June		10 00	10 00	10 00						30 00	140 00
July		10 00	40 00							50 00	104 00
August		20 00	20 00	6 00	25 00					71 00	30 00
September	210 00		140 00							350 00	208 00
October	80 00		40 00	17 00						137 00	90 00
November	260 00	10 00	20 00	2 00						292 00	75 50
December	50 00			4 00						54 00	105 00
January				8 00						8 00	16 00
February		40 00	50 00	2 00		2 50			2 50	97 00	25 00
March	20 00	10 00		2 00						32 00	10 00
Totals	620 00	220 00	460 00	63 00	25 00	7 50			7 501,	403 00	995 50
Receipts	62	22	46	24	5	3			3	165	133 00

No. 29d.

DAWSON, Y.T., April 20, 1915.

(*Re File No. 3525-3.*)

SIR,—I have the honour to submit the annual report of the Comptroller's Office for the fiscal year ending March 31, 1915.

Under the appropriation through the Department of the Interior, "Administration of the Yukon Territory," the expenditure amounted to $132,050.07, as shown by the monthly statements and vouchers forwarded to the department.

The expenditure on account of the Department of Justice was $18,911.30, monthly returns being made to that department.

Under the Letter of Credit account, Department of Public Works, for maintenance and repairs of public buildings in the Yukon Territory, the expenditure was $58,939.02.

The expenditure on account of the Department of Indian Affairs for the relief of sick and destitute Indians in the Yukon Territory was $10,667.88.

The royalty export tax collected in the territory for the year ending March 31 amounts to $116,241.04; collected at Dawson, $115,890.11; Whitehorse, $350.93; at Forty-mile, nil. This is a decrease from last year's collections, due largely to a shorter mining season, power difficulties on the part of one of the large companies operating dredges, and to the sinking of one of the largest dredges operated by the other company.

The revenue from free certificates issued to exporters of gold from Alaska was $107; collected at Dawson, $87.50; and Whitehorse, $19.50; a decrease of $14 under last year's collections.

The revenue collected in the Gold Commissioner's office on account of mining dues amounted to $65,563.24; and in the Crown Timber and Land Agent's office on account of crown timber, $11,018.37; and Dominion Lands, $4,698.26. The revenue from these various sources was deposited in the Dominion Revenue Trust account in the Canadian Bank of Commerce daily as received, and drafts purchased weekly in favour of the Receiver General, and forwarded to the department. Weekly statements of these various sources of revenue, with counterfoils, were checked in this office and transmitted to the department, and monthly summaries were also checked and transmitted.

The revenue in the registrar's office on account of land titles fees for the year ending March 31, amounted to $969.85, which was deposited daily in the Dominion Revenue Trust account as received, and drafts purchased weekly in favour of the Receiver General, and forwarded to the department. Monthly statements in duplicate were also checked in this office and forwarded to the department.

The revenue from the sale of Yukon Territorial Court law stamps amounted to $2,233.85, an increase of $508.10 over last year.

I have the honour to be, sir,

Your obedient servant,

G. J. McKELL,
Controller.

No. 29e.

DAWSON, April 10, 1915.

SIR,—I have the honour to submit herewith my report for the fiscal year ending March 31, 1915, accompanied by the following statements:—

1. Statement in duplicate showing the revenue collected in the Timber Branch of this office from royalty on wood and timber cut on timber berths, dues paid in connection with timber and wood permits, seizure dues on wood and timber cut in trespass, and hay permits;

2. Statement in duplicate of revenue collected in the Dominion Lands Branch of this office, on land rentals, land sales, office fees, rental coal lands, and homestead entries.

These statements show a net increase of $256.80 in the Land Branch, and a decrease in the Timber Branch of $3,534.22. This decrease in the timber branch is accounted for largely by the fact that more coal is being used each succeeding year for domestic purposes with a consequent decrease in the amount of wood used upon which dues are collected.

WOOD AND TIMBER.

The Yukon Saw-mill Company operated throughout the open season, although not on as large a scale as formerly, and have now on hand a well assorted stock of lumber.

A portable saw-mill, owned and operated by the Calder Mining Company, cut approximately 100,000 feet board measure lumber on Quartz creek, to be used in their mining operations in that vicinity.

A mill at Mayo, owned and operated by C. L. Snell, cut approximately 50,000 feet board measure lumber, which was used in the Duncan district, mostly for mining purposes.

The winter of 1914-15 was the mildest of which any record has been kept and a consequent saving of fuel for domestic consumption was effected, while the Dawson woodyards have on hand a larger supply of wood than ordinarily carried.

I am pleased to report that no forest fires of any consequence occurred during the year. Under the authority vested in me, several permits to burn slashed timber were issued but in each case only after very careful investigation and when satisfied that all the provisions of the Ordinance covering this matter had been complied with.

In this connection I beg to point out that the usual practice of preparing wood for mining purposes is to slash all timber over a given area and then, when the brush is partially dried, to burn the same. This burning of slashed timber is one of the causes of forest fires, and all vegetable life is absolutely killed in any district so burned. After careful investigation I am of the opinion that this practice should be entirely discontinued, after sufficient notice has been given the wood contractors and mining operators so that no contracts now in existence for providing wood under this arrangement would be effected thereby. From the best information obtainable, it would appear that the increased cost of preparing wood for use, if slashing and burning was not allowed, would be approximately $1 per cord, but it is, I think, generally conceded by the mining operators that the value of the wood if cut and blazed or split without burning, would be enhanced at least that amount per cord.

Frequent inspections of wood camps in the vicinity of Dawson were made by the timber inspector, who also made an inspection of camps on the Stewart and Yukon rivers during last summer.

Many thousands of cords of wood were cut and used for mining purposes, upon which no dues were collected.

COAL.

The Five Fingers Coal Company operated their mine at Tantalus during the fiscal year on a larger scale than in any former year, a part of their output being used in the locomotives of the White Pass and Yukon route, in addition to which an ample supply of coal of good quality is now kept on hand in the bunkers at Dawson.

The Northern Light, Power and Coal Company also operated their mine at Coal creek, the greater part of their output being used in their plants at Coal creek and Dawson in the producing of electric power.

AGRICULTURE.

The farming industry continues to expand. The bulk of the vegetable and garden truck consumed in the territory is now grown locally, and a considerable quantity of grain is grown which is usually cut green for fodder. Six homestead entries were granted during the year.

Your obedient servant,

G. B. MACKENZIE,
Crown Timber and Land Agent.

——	Royalty.	Timber Permits.	Seizure Dues.	Hay Permits.	Total.
	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
1914.					
April	512 20	220 00	25 00	.....	757 20
May	491 50	233 00	182 00	20 00	926 50
June	851 48	101 75	72 00	17 00	1,042 23
July	366 50	20 00	.....	5 00	391 50
August	275 00	.....	206 00	5 00	486 00
September	1,435 00	346 85	139 25	.....	1,921 10
October	1,162 88	696 00	190 00	.....	2,048 88
November	290 00	48 50	139 00	.....	477 50
December	865 50	.....	19 00	.....	884 50
1915.					
January	170 00	368 50	272 50	.....	811 00
February	607 00	3 96	6 50	.....	617 46
March	.....	632 00	22 50	.....	654 50
Totals	7,027 06	2,670 56	1,273 75	47 00	11,018 37

Total receipts, 1913–14	$14,552 59
" 1914–15	11,018 37
Net decrease, 1914–15	3,534 22

Certified correct,

FRANK BROCK,
Accountant.

	Land Rentals.	Land Sales.	Office Fees.	Rental Coal Lands.	Homesteads.	Total.
1914.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
April	2,020 63		4 50			2,025 13
May	1,028 50	67 40			10 00	1,105 90
June	145 98	46 00				191 98
July	12 50		8 25			20 75
August	7 50					7 50
September	79 85				10 00	89 85
October	186 54	225 92			10 00	422 46
November	40 68	93 80				134 48
December	15 00	307 65			10 00	332 65
1915.						
January		85 42			10 00	95 42
February	213 37			40 00	10 00	263 37
March	8 77					8 77
Totals	3,759 32	826 19	12 75	40 00	60 00	4,698 26

Total receipts, 1913–14	$ 4,441 46
" 1914–15	4,698 26
Net increase, 1914–15	256 80

Certified correct,

FRANK BROCK,

Accountant.

No. 29f.

WHITEHORSE, Y.T., March 1, 1915.

SIR,—I have the honour to submit a statement of the work done in this office during the twelve months preceding March 1, 1915, together with a brief summary of conditions in quartz mining in different parts of the territory.

During the above mentioned period, 813 samples of rock were received, and 1,061 assays or quantitative determinations were made, comprising twelve elements.

In addition to the above a considerable number of qualitative determinations were made in connection with the identification of various rocks and minerals.

A detailed statement is attached to this report, showing the various elements for which assays were made, and the different districts from which the samples were received.

In the Whitehorse district, the greatest amount of work was done on the Pueblo Group of copper claims near Whitehorse, belonging to the Atlas Mining Company.

This property was steadily worked from the beginning of the year until September 14, when, owing to adverse conditions brought on by the European war, the mine was closed down, only a pumping crew being retained. On October 22, pumping was discontinued and the mine allowed to fill with water.

Shipping of ore was resumed on April 28, and continued until September 20, a total of 21,220 tons of ore being shipped to the smelter, this amount all coming from

the 200- and 400-foot levels. The main shaft on the property was sunk a further 80 feet making the total depth 445 feet. One raise was put up 59 feet from the 400-foot level. A total of 983 feet of drifting and cross-cutting was done, opening up the 400-foot level, where stopping was commenced. From the beginning of the year until the mine closed down, an average of 126 men were employed. The ore consists of a cupriferous hematite. There is every reason to believe that when the war is over, mining operations on this property will be resumed on a larger scale than before.

In the Wheaton River district, Messrs. Becker & Cochrane have incorporated their group of claims, under the name of the Wheaton Mining Company, with a capital stock of $90,000. This stock has been taken up almost entirely by residents of Whitehorse, and development work on the claims will be carried on steadily henceforth. At the present time a tunnel is being driven on one of the claims to cross-cut the main ledge at a depth of 125 feet.

Outside of assessment work, nothing has been done on the other properties in this district.

In the Watson River district, Ernest Johnson's claims are showing up very well. The ledge is about 5 feet wide, and is composed of quartz impregnated with Galena, carrying good values in gold and silver. Over 1,000 feet of open-cutting has been done on this property, and an incline is being started in order to open up ore for shipping. It is the intention of Mr. Johnson to send out a trial shipment in the near future. The distance to the railway is about 45 miles, but all down grade.

In the Windy Arm district, H. L. Van Wyck, representing a Vancouver syndicate, was busy through the past summer on the Humper group of claims. A thorough examination and sampling was done, but further work was stopped on the outbreak of war. This is a very promising property, and work will no doubt be resumed at the close of the war. Near this group, P. Kennedy has done considerable work on his ground and uncovered some very good ore running high in silver. He is at present running a drift of 250 feet on the ledge.

In the Dawson district, the "Lone Star" mine was worked steadily from 15th May until early fall. During that period 2,348 tons of ore were milled. A considerable fault in the open cut was encountered early in the season, and this, along with a large slide of surface waste in the open cut, caused operations to be suspended for the season earlier than usual. All the ore mined in the last three years has been taken without selection out of a straight open cut, which is now 40 feet deep and 325 long. During this time, 8,435 tons of ore have been milled, and all the values obtained have been saved by simple plate amalgamation, there being no fine grinding and cyanide plant on the property.

As considerable sulphide rock was frequently encountered, it is reasonable to conclude that the value of the ore must have been larger than what was actually saved. Some 1,864 pounds of this sulphide rock was hand-picked, and shipped to the Selby Smelting Works, San Francisco, who returned a total value of $2,008.71. An addition to the millhouse was made last spring, and a concentrator installed therein.

On Bear creek, work has been steadily carried on by the "Bear Creek Mining Company," on their properties. A "Little Giant" stamp mill of small capacity, operated by electric power, was kept working during the summer. Three clean-ups were made, giving a total amount of 281 ounces of gold. Nine men were employed during the summer, and a small crew kept on through the winter driving tunnels, cross-cutting, and blocking out ore. It is the intention of the company to install a modern ten-stamp mill on the ground. A tunnel has been driven on the 230-foot level, which is now in about 200 feet, the last 40 feet of which is cross-cutting a mineral-bearing lode with no signs of the foot wall yet in sight. The company is very well satisfied with the property, and is showing its faith in it by going to a considerable expenditure in installing all modern conveniences.

Not much work has been done on other quartz properties in the Dawson district, outside of assessment and development work.

In the Stewart River district, the silver-lead mines near Mayo are attracting considerable attention. H. McWhorter, owner of the Silver King mine, is having over 1,000 tons of ore hauled to the steamer landing at Mayo, from whence it will be shipped outside to the smelter. Stopping out ore and sinking the shaft is going on at the same time. The shaft is now 140 feet deep, and the ore improving with depth. At the 100-foot level, a drift of 100 feet has been driven, and at the 40-foot level, another drift of 60 feet has been put in. Selected samples of ore have assayed as high as 15,000 ounces in silver to the ton. Last year a shipment of 60 tons was shipped outside to the smelter, the returns showing an average of $270 per ton. The vein averages 4 feet in width, the hanging wall being schist, and the foot wall quartzite. According to the present showings this mine has all the appearance of becoming a large producer.

Other claim owners in the vicinity are busy sinking, trenching, and opening up their properties.

In the Dublin Gulch district, the most work has been done on the Stewart-Catto group of claims. Over 600 feet of tunnelling and shaft sinking has been done, showing up a large body of gold-bearing rock. On the Olive claim, owned by Kinsey, *et al.*, last year's tunnel has been extended 150 feet along the vein.

Besides the rich placer and mineral deposits, the Yukon Territory also contains extensive coal-bearing formations, which will constitute a great mineral asset to the country, and the possible future economic importance of these fuel deposits should not be overlooked.

The coal production in the country has been small, partly because there has been little demand for coal up to the present, and partly because only a few of the deposits are conveniently situated for shipping. At the present time there are only two companies engaged in coal mining in the territory, one, the Northern Light and Power Company, operating at Coal creek, a few miles below the town of Forty-mile, and the other, the Five Fingers Coal Company, situated on the left bank of the Yukon river, about 190 miles below Whitehorse. On Coal creek a considerable amount of coal is mined and shipped to Dawson every year. A small narrow-gauge railroad is operated between the mine and the month of the creek, and from there the company's steamer and barges transport the coal to Dawson.

There are three principal seams, the "Ten Foot," the "Sour Dough," and the "Old Sour Dough." The "Ten Foot" seam varies from 5 feet to 14 feet in thickness, and averages about 10 feet. About 200 feet below this, is the Sour Dough seam, which in most places is about 14 feet in thickness, but at one point is as much as 30 feet thick. The Old Sour Dough seam, about 4½ feet below the Sour Dough, is in most places about 12 feet thick. The coal in all three seams is very similar in quality.

The coal in the Tantalus coal mine outcrops on the river bank, and is well situated for economic mining. A slope has been sunk for 150 feet on the dip of the lower seam, and a tunnel or haulage way run in some 600 feet. Sixteen rooms were opened up from which 2,000 tons of coal were taken last year. The seam at this depth is 13 feet wide, with excellent coal, much harder and firmer than has been found at any other place on the property. The owners expect to continue working on this seam for a number of years. The point to which this slope was sunk is about 200 feet from the main entrance. A donkey hoisting engine has been installed at this point whereby the cars are hauled to the upper level, and from there to the yards, the haulage-way being double tracked. The cars are then hauled up an incline about 100 feet, the coal dumped into a receiving hopper, from which it gravitates over the picking table, and is thence conveyed by scraper conveyor to the bunkers ready for shipment.

The colliery is in splendid condition, equipped with modern machinery, and well ventilated. The output for last year was close on 5,000 tons. This coal makes an

excellent coke, which will be a big item in the event of a smelter being established in the country.

Certain river bars on the Hootalinqua river have been found to contain considerable quantities of platinum, and as rock from other parts of the country has been assayed in this office giving good results in platinum, prospectors are turning their attention to the finding of this valuable metal. There is every probability of this becoming an important feature in the future of the territory.

In conclusion, I may say that the future for hard-rock mining in the Yukon looks very promising. In the Mayo district the silver mines are giving excellent results; in the Dawson district there are two companies actively engaged in opening up and developing their properties, one of which intends to install a ten-stamp mill on their ground; in the Whitehorse district the copper mines are only temporarily closed down on account of the war; in the Windy Arm district, mining engineers representing outside capital, were engaged last summer examining the various properties; in the Wheaten district there are several promising gold and silver properties which only lack capital to prove their worth.

There is every reason to believe, therefore, when this war is over, and business resumes its normal aspect, capital will come in, good properties will be opened up, and hard rock mining become an established fact in the Yukon Territory.

I have the honour to be, sir,

Your obedient servant,

WM. C. SIME,

Territorial Assayer.

Assays made in the Territorial Government Assay Office at Whitehorse, Y.T., from March 1. 1914, to March 1, 1915:—

Gold and silver	813
Copper	108
Lead	107
Platinum	24
Tin	3
Zinc	1
Iron	1
Mercury	1
Bismuth	1
Iridium	1
Osmium	1
	1,061

Total number of samples received, showing districts from which they were taken:—

Dawson	238
Mayo	126
Windy Arm	69
Whitehorse	60
Wheaton	58
Atlin, B.C.	49
White river	39
Kluane	39
Conrad	31
Dublin Gulch	22
Big Salmon	20
Sixty-mile	18
Hootalinqua river	12
Nansen	8
Pelly river	8
Aishihik	7
Teslin	12
Alsek	4
	813

No. 30.

REPORT OF THE TIMBER AND GRAZING LANDS BRANCH.

OTTAWA, July 8, 1915.

W. W. CORY, Esq., C.M.G.,
Deputy Minister of the Interior,
Ottawa.

SIR,—I beg to submit herewith the report of the Timber and Grazing Lands Branch for the fiscal year ending the 31st March, 1915.

The revenue derived from timber, grazing lands, and hay lands for the year amounted to $375,385.19.

At the conclusion of this report will be found statement A, which sets out the total revenue of the branch from its various sources, for the year; and statement B, showing the timber by agencies; and statement C, other sources of revenue by agencies.

Reports from the Crown Timber Agents at Calgary, Edmonton, Prince Albert, Winnipeg, New Westminster, Kamloops, and Revelstoke, setting out the revenue collected on Dominion Lands within their respective agencies and other information are appended hereto.

The report of the Inspector of Crown Timber Agencies, whose headquarters are at Winnipeg, and the reports of the Inspectors of Ranches located at Calgary, Maple Creek, Moosejaw, and Minnedosa are also attached.

The revenue derived from the timber and grazing lands, received at the Crown Timber Agencies above mentioned, also the number of mills operated on berths held under license, and the number of portable saw-mills in operation may be summarized as follows:—

Agency.	Total Revenue.	No. of Mills operating under license.	No. of Mills operating under permit.
	$ cts.		
Calgary	25,898 69	16	17
Edmonton	54,560 26	37	70
Prince Albert	51,557 49	16	30
Winnipeg	59,641 06	30	48
Kamloops	20,261 87	3	.....
New Westminster	73,940 87	24	.....
Revelstoke	3,128 92	3	.....

The returns of operations received show the following quantities of building material to have been manufactured and sold under government license during the year in the timber agencies above referred to:—

—	Manufactured.	Sold.
Sawn lumber, ft. b.m	173,203,615	156,919,420
Shingles	208,750	125,750
Railway ties	144,745	152,073
Laths	21,956,679	25,292,894
Lineal feet piling	155,546	124,084
Shingle bolts	188,325	152,885
Mining props	37,000	.....
Mining ties	2,568	1,400
Telegraph poles	5,624	.....
Fence posts	.....	1,401

The following material was manufactured and sold on permit berths and portable saw-mill berths:—

—	Manufactured.	Sold.
Sawn lumber, ft. b.m	26,255,288	20,225,707
Laths	2,073,000	2,073,000
Shingles	2,869,000	2,181,760
Railway ties	1,270	1,540

The quantity of lumber manufactured and sold within each agency will be found in the agents' reports appended hereto.

The areas of timber lands held under license and permit in the provinces of Manitoba, Alberta, Saskatchewan, and in the Railway Belt in the province of British Columbia, are as follows:—

Agency.	Under License.	Under Permit.
	Sq. Miles.	Sq. Miles.
Manitoba	1,277·22	615·32
Alberta	2,200 90	38·75
Saskatchewan	2,031·47	150·73
British Columbia	1,763·34	4·49
	7,272·93	809·29

During the year forty-nine timber berths were granted, of which four were license, thirty-five portable saw-mill, nine cordwood, and one permit.

GRAZING LANDS.

There were in force, on March 31, 1915, 2,457 grazing leases, covering a total area of 4,853,555 acres in the provinces of Manitoba, Alberta, Saskatchewan, and British Columbia.

	Acres.
Manitoba	24,843
Alberta	2,330,110
Saskatchewan	2,106,222
British Columbia	392,380
	4,853,555

This shows an increase over last year's figures of 541 leases in existence, and 372,753 acres.

OFFICE WORK.

The following is a partial statement of the office work performed at Ottawa during the fiscal year:—

Letters received and recorded	27,073
Letters sent	39,342
Plans and sketches prepared	557
Timber berths applied for	161
Return of survey of timber berths, examined and re-examined	7
Applications for grazing lands received	1,700
Applications for hay lands received	20
Timber berths and ranches plotted on township plans for agents	265
Cash receipts issued in quadruplicate	2,329
Timber and grazing assignments registered	128
Timber ledger accounts kept posted	847
Fireguarding accounts kept posted	835
Seizures checked and entered	351
Timber permits checked and entered	9,590
Hay permits checked and entered	2,941
Grazing ledger accounts kept posted	2,447
Hay ledger accounts kept posted	10
Grazing leases issued in triplicate	756
Licenses for timber berths prepared in duplicate	665
License berths granted	4
Portable sawmill berths granted	35
Cordwood berths granted	9

Your obedient servant,

B. L. YORK,

Controller.

STATEMENT A.—Statement of Revenue for year ending March 31, 1915.

Month.	Timber.	Grazing.	Hay.	Registration Fees.	Fire-guarding.	Total.
	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
April	26,664 69	10,984 36	2,871 05	.....	50 31	40,570 41
May	32,957 86	8,221 79	1,317 02	24 00	412 05	42,932 72
June	26,239 40	6,441 53	1,022 80	2 00	84 77	33,790 50
July	37,040 91	7,730 69	1,526 00	2 00	315 14	46,614 74
August	11,863 74	10,035 56	457 90	6 00	54 21	22,417 41
September	9,536 34	7,351 24	209 92	22 71	29 32	17,149 53
October	31,706 91	5,358 12	37 10	.....	12 00	37,114 13
November	22,783 66	7,333 74	8 70	12 00	130 26	30,268 36
December	22,145 70	10,897 95	6 20	2 00	36 92	33,088 77
1915.						
January	15,002 45	6,810 14	4 20	5 00	.....	21,821 79
February	13,401 70	6,738 25	23 50	6 00	.....	20,169 45
March	22,075 36	7,326 62	38 40	7 00	.....	29,447 38
	271,418 72	95,229 99	7,522 79	88 71	1,124 98	375,385 19

Certified correct,

JOS. SHIELDS,

Clerk in charge of Accounts.

STATEMENT B.—STATEMENT of Revenue of Timber Dues for fiscal year 1914-15.

Agency.	Bonus under License.	Rental under License.	Royalty under License.	Permit Fees, Dues and Rental.	Seizures.	Total.
	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
Battleford				555 51		555 51
" Head Office				0 50		0 50
Brandon						
" Head Office						
Calgary		2,868 22	6,741 20	3,896 85	282 07	13,788 34
" Head Office		2,354 02		0 50		2,354 52
Dauphin				910 35	499 60	1,409 95
" Head Office						
Edmonton	4,095 46	5,102 08	5,885 75	33,407 72	3,600 56	52,091 57
" Head Office		485 64	3 14	0 25	306 84	795 87
Estevan						
" Head Office						
Grand Prairie				362 39		362 39
" Head Office				10 00	157 00	167 00
Grouard				484 73	271 84	756 57
" Head Office				0 25	22 50	22 75
Humboldt				82 20	70 82	153 02
" Head Office					426 79	426 79
Kamloops		1,623 93	9,084 49	731 07	1,025 50	12,464 99
" Head Office		7 06	123 56			130 62
Lethbridge				68 75		68 75
" Head Office						
Maple Creek				199 50		199 50
" Head Office				2 25		2 25
Medicine Hat				36 30		36 30
" Head Office						
Moosejaw				48 75		48 75
" Head Office						
New Westminster	11,415 45	21,313 85	22,498 81	10,337 65	6,454 35	72,020 11
" Head Office		516 71	1,291 62		100 00	1,908 33
Prince Albert	1,043 64	6,835 24	32,840 84	7,232 82	2,189 96	50,142 50
" Head Office		288 69	2 25		73 21	364 15
Red Deer				790 63	88 97	879 60
" Head Office						
Regina						
" Head Office				2 00		2 00
Revelstoke		969 25	915 03	120 16	223 18	2,227 62
" Head Office		525 67				525 67
Saskatoon				60 75		60 75
" Head Office						
Swift Current				54 75		54 75
" Head Office				1 25		1 25
Winnipeg	1,571 92	8,606 53	19,517 20	21,085 12	5,831 39	56,612 16
" Head Office		498 95		25 75		524 70
Weyburn				2 50		2 50
" Head Office				0 50		0 50
Yorkton				240 14	16 05	256 19
	18,126 47	51,995 84	98,903 89	80,751 89	21,640 63	271,418 72

Certified correct,

JOS. SHIELDS,

Clerk in charge of Accounts.

SESSIONAL PAPER No. 25

STATEMENT C.—STATEMENT of Revenue from Grazing, Hay, Registration Fees, and Fire-guarding Dues for fiscal year 1914-15.

Agency.	Grazing.	Hay.	Registration Fees.	Fire-tax.	Total.
	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
Battleford	749 83	498 65			1,248 48
" Head Office	444 66	3 50			448 16
Brandon	3 20	190 30			193 50
" Head Office	203 20	21 20			224 40
Calgary	4,255 37	58 80			4,314 17
" Head Office	5,428 41	13 25			5,441 66
Dauphin	92 30	418 60			510 90
" Head Office	261 60				261 60
Edmonton	105 24	1,011 60	4 00	124 46	1,245 30
" Head Office	416 02	11 50			427 52
Estevan	36 80	11 00			47 80
" Head Office	482 65				482 65
Grand Prairie	454 25	320 20			774 45
" Head Office	172 16	10 00			182 16
Grouard	112 70	575 10			687 80
" Head Office	44 80				44 80
Humboldt	31 35	176 05			207 40
" Head Office	83 20				83 20
Kamloops	6,513 19	17 00	16 00	321 29	6,867 48
" Head Office	798 78				798 78
Lethbridge	3,132 73	12 15			3,144 88
" Head Office	5,085 18				5,085 18
Maple Creek	11,599 56	367 55			11,967 11
" Head Office	8,116 03				8,116 03
Medicine Hat	20,260 20	216 95			20,477 15
" Head Office	4,713 28	1 60			4,714 88
Moosejaw	3,310 28	285 27			3,595 55
" Head Office	3,546 85				3,546 85
New Westminster	0 72			11 31	12 03
" Head Office	0 40				0 40
Prince Albert	202 91	441 45	15 50	87 38	747 24
" Head Office	303 60				303 60
Red Deer	135 42	362 82			498 24
" Head Office	526 80				526 80
Regina	4 52	9 50			14 02
" Head Office	49 51				49 51
Revelstoke	6 40	5 40	5 00	358 83	375 63
" Head Office					
Saskatoon	146 14	246 75			392 89
" Head Office	487 78	0 50			488 28
Swift Current	3,632 25	216 10	2 00		3,850 35
" Head Office	7,739 02				7,739 02
Weyburn	390 27	162 70			552 97
" Head Office	606 85				606 85
Winnipeg	397 47	1,704 90	46 21	221 71	2,370 29
" Head Office	138 11	10 00			148 11
Yorkton	4 80	132 40			137 20
" Head Office	3 20	10 00			13 20
	95,229 99	7,522 79	88 71	1,124 98	103,966 47
Fire-guarding, Head Office				16,189 28	16,189 28
					120,155 75

Certified correct.

JOS. SHIELDS,

Clerk in charge of Accounts.

No. 30a.

WINNIPEG, June 1, 1915.

SIR,—I beg to submit the annual report of my office for the departmental year ended March 31, 1915, appended to which will be found the following statements showing the business transacted at the several Crown Timber offices and amount of revenue collected by each, respectively:—

"A."—Work performed and amount of revenue collected.

"B."—Output of lumber at mills operating under license and permit and sales thereof.

"C."—Timber authorized to be cut under timber permits issued to settlers.

"D."—Number of hay permits issued and tonnage of hay covered thereby and revenue for same.

During the year I visited and made inspection of all the offices listed for me to inspect, and, in some cases, I made a second and third inspection.

The work was found, on the whole, being carried along in a satisfactory manner, but my reports which were sent you as my inspections were made gave full particulars in that connection.

My assistant, Mr. H. W. Clarke, was kept busily engaged during the year with auditing the books of licensees and permittees for the purpose of checking up the manufacture and sale of lumber at the mills being operated by them. His reports were duly sent forward to the department.

The lumber industry is still suffering from the general depression in trade which has existed for some time past. Strong hopes are entertained on account of the good promise for a bountiful harvest that the building trade will improve in the autumn. Very little logging was done last winter and stocks of lumber in the hands of most of the lumbermen are low.

An increased demand is shown during the year for timber and hay permits from the settlers, indicating that a large number of land owners have returned to farming operations, due in some measure to the higher market price to be obtained for farm produce, and the fact that business along other lines is dull and in most cases unprofitable.

Respectfully submitted,

E. F. STEPHENSON,

Inspector of Crown Timber Agencies.

STATEMENT A.—Summary of work performed at the respective Crown Timber Offices during the year ended March 31, 1915.

Agency.	Timber and Grazing Branch.								Forestry Branch.				School Lands Branch.				Revenue.
	Bonus.	Ground Rent.	Royalty on Sales.	Timber Permits.	Timber Seizures.	Hay Permits.	Grazing Rental.	Sundries.	Permits, Dues and Rentals.	Seizures.	Grazing Rentals.	Hay Permits.	Timber Permits.	Hay Permits.	Grazing Permits.	Sundries.	
																	$ cts.
Battleford				707		143	169	12	346					200	50		2,051 73
Brandon				2		85	2		147	2	35	55		62	23		1,458 00
Calgary		51	55	256	17	35	277		114	3	21	8	1	297	215		32,711 15
Dauphin				496	39	166	21		1,102	22	7	112	6	130	20		11,097 61
Edmonton	2	82	55	2,327	85	447	18	619	13	3	9	16	16	335	76	11	57,870 33
Estevan						4	11		89	7	4	13		72	11		553 02
Grande Prairie				401		110	46	33						10	14	1	1,348 46
Humboldt				179	11	86	11	13						206	86	15	1,593 39
Kamloops		41	27	322	48	6	348	14	17		6	8					19,451 43
Lethbridge				102		12	145		418	11	84	19		22	77	10	8,896 08
Maple Creek				687		237	908	29	345					170	88		15,754 69
Medicine Hat				64		391	602		268	7	1	218		56	77		30,151 52
Moosejaw				144		96	291	2	121			15	2	781	95	1	5,764 35
New Westminster	2	212	93	140	24		2	3									72,031 84
Peace River				433	1	134	8		2			1		19	19		1,762 40
Prince Albert	3	21	26	1,203	32	189	28	1	693		22	37	26	169	39	6	39,321 73
Red Deer				258	12	60	24	18	7		4	5	5	193	96		3,558 34
Regina						4	4		58			16	6	257	80		1,637 53
Revelstoke		38	9	82	8	2	2	11									2,244 42
Saskatoon				110		84	33	2	154		7	1	7	341	42	9	1,918 10
Swift Current				206		110	194	6	2		7	415		325	197	7	7,028 67
Yorkton				202	2	37	2		289	3		30	2	122			1,360 99
Weyburn				10		53	43							172	34		1,450 89
Winnipeg	3	128	78	2,050	54	642	124	30					124	326	14	1	62,132 91
Total	10	576	343	10,381	333	3,137	3,302	793	4,184	58	207	981	195	4,837	1,353	61	383,149 58
For previous year	29	555	328	11,859	767	3,174	2,059	823					206	3,634	621	143	436,078 19

E. F. STEPHENSON,
Inspector Crown Timber Agencies.

STATEMENT B.—Showing manufacture and sale of Timber Products cut by holders of Timber Berths on Dominion Lands cut under yearly license during the Fiscal Year ended March 31, 1915.

Agency.	Lumber, B. M.			Lath.			Railway Ties Sold.	Shingles.		Piling and Mining. Props.	Saw Logs.		
	Manufactured.	Marketed.	On hand.	Manufactured.	Sold.	On hand.		Manufactured.	Sold.		Pcs. cut.	Manufactured.	On hand.
Calgary	18,443,397	14,368,931	22,147,856	608,350	468,200	242,675	36,586				294,585	453,621	599,659
Edmonton	12,610,598	13,444,999	17,822,560	1,141,150	385,025	756,125	29,282				155,171	270,246	233,922
Kamloops	5,336,655	5,336,655		5,624	5,624		2,654				65,701	65,701	
New Westminster	48,063,455	48,063,455					16,595	18,832	18,832	117,425	73,378	71,407	2,818
Prince Albert	49,807,256	46,801,384	54,195,325	9,397,475	10,075,850	1,479,650	101,749				394,861	729,675	2,403,774
Winnipeg	32,829,280	32,254,566	24,066,098	9,164,704	13,306,629	935,325	64,825	81,000	20,000		288,316	578,296	513,139
Revelstoke	6,112,968	6,112,968					3,370				45,088	45,088	
Total	173,203,615	166,382,968	118,231,839	20,317,303	24,241,328	3,413,775	255,061	99,832	38,832	117,425	1,317,100	2,214,034	3,753,312
TIMBER CUT FOR TRADE UNDER TIMBER PERMITS.													
Calgary	4,116,314	3,402,952	1,704,703				154	151,750	151,750	798,338	225,911	237,265	43,613
Edmonton	14,380,573	6,251,268	11,619,246	2,073,000	2,073,000		1,540				241,358	301,735	238,079
Kamloops													
New Westminster													
Prince Albert	4,705,370	4,557,586	1,111,906	352,400	352,400			871,000	837,000	292	36,198	77,629	37,950
Winnipeg	3,053,031	4,821,650	3,041,533								128,368	79,403	83,616
Revelstoke													
Total	26,255,288	19,033,456	17,477,388	2,425,400	2,425,400		1,694	1,022,750	988,750	798,630	631,835	686,032	403,258
Grand total	199,458,903	185,416,424	135,709,227	22,742,703	26,666,726	3,413,775	256,755	1,122,582	1,027,582	916,055	1,948,935	2,900,066	4,156,570
Year 1913-1914	333,522,970	318,770,786	119,582,056	34,356,908	35,058,448	11,261,807	2,320,445	96,746,500	92,894,750	13,800,467	4,707,585	4,425,266	3,872,865
Year 1912-1913	375,729,402	369,621,540	107,237,325	50,288,937	54,464,739	9,394,962	508,046	68,721,065	68,843,815	457,685	5,131,859	5,364,915	5,437,902

E. F. STEPHENSON,
Inspector of Crown Timber Agencies.

STATEMENT C. —Timber material covered by Permits issued at the respective Agencies, principally to Homestead Settlers, during the year ended March 31, 1915.

Agency.	Lumber and Logs.	Fence Rails.	Roof Poles.	Fence Posts.	Cords Cord-wood.	Railway Ties.	Telegraph Poles.	Mining Poles.	Cords Shingle Bolts.
	Ft. B. M.								
Battleford	5,531,058	229,650	55,171	104,975	2,187				
Brandon	57,088	1,500		3,395	3,438				
Calgary	4,027,241	84,496	16,525	46,765	2,631			1,502,700	
Dauphin	4,355,443	1,600	2,550	46,783	12,332				
Edmonton	14,832,705	2,832,759	522,621	620,692	3,255	447,961		2,571,022	45,150S
Estevan	2,250		100	1,100	633				
Grande Prairie	2,565,332	577,790	109,582	143,720	4,070				14,000S
Humboldt	945,113	7,950	6,350	2,510	92				
Kamloops	4,772,270	36,755	10,173	141,882	7,588	67,678	10,311		988B
Lethbridge	757,605	36,005	22,538	41,986	5,131		30	5,000	
Maple Creek	5,203,707	1,031,571	225,965	325,336	9,618				
Medicine Hat	875,916	20,140	62,132	49,940	2,323				
Moosejaw		10,313	7,000	11,160	2,619				
New Westminster	3,482,090				15				1,638B
Peace River	2,888,854	181,503	116,361	159,230	7,141				
Prince Albert	5,122,413	899,029	183,835	313,698	27,696	27,007			
Red Deer	950,868	61,950	14,250	53,548	2,784	200		318,200	
Regina	15,780	2,140	550	2,300	493				
Revelstoke	202,384	300	60	1,800	2,537	4,350	2,243		22B
Saskatoon	135,660	23,450	10,625	19,300	735				
Swift Current	9,000	14,050	8,345	14,274	1,049				
Winnipeg	6,002,862	71,165	43,201	151,312	119,811	11,000	55		
Weyburn			1,900	3,300	70				
Yorkton	2,160,169	15,260	4,570	32,760	1,876				
Total	64,895,838	6,139,376	1,424,404	2,291,766	220,169	585,196	12,639	4,396,922	61,798

E. F. STEPHENSON,

Inspector of Crown Timber Agencies.

STATEMENT D.—Showing the number of Hay Permits and the amount of Hay covered thereby issued to settlers from the several Dominion Lands Offices in Manitoba, Saskatchewan, Alberta and British Columbia, for the year ended March 31, 1915.

Agency.	DOMINION LANDS.		SCHOOL LANDS.		FORESTRY.		Revenue.
	No. Pts. Issued.	Tons Hay.	No. Pts. Issued.	Tons Hay.	No. Pts. Issued.	Tons Hay.	
							$ cts.
Battleford	143	4,084	200	3,309	.....	.....	923 17
Brandon	85	1,263	62	888	55	.....	446 40
Calgary	35	651	297	9,580	8	172½	1,023 50
Dauphin	166	3,493	130	1,991	111	1,721	903 15
Edmonton	447	6,957	335	5,313	16	567	1,799 80
Estevan	4	98	72	1,163	12	160	179 90
Grande Prairie	110	2,901	10	159	.....	.....	327 60
Humboldt	86	1,400	206	3,362	.....	.....	596 50
Kamloops	6	76	.....	.....	8	146	21 60
Lethbridge	12	296½	22	407½	19	359½	133 10
Maple Creek	235	8,201	170	3,381	73	.....	998 45
Medicine Hat	391	12,924	56	1,165	218	5,237½	904 10
Moosejaw	96	1,269½	781	9,152	15	170	1,107 15
New Westminster	.....	.....	.....	.....	.....	.....	.....
Peace River	134	3,560	19	355	.....	.....	611 85
Prince Albert	189	3,036	169	2,605	37	737	899 75
Red Deer	60	3,477	193	7,385	4	306	1,066 67
Revelstoke	2	44	.....	.....	.....	.....	5 40
Regina	4	75	257	7,887	16	441	900 75
Saskatoon	86	1,853	341	6,336	1	.....	1,047 75
Swift Current	111	1,936	325	5,761	(Not	Known)	914 00
Winnipeg	642	12,451	316	6,942	.....	.....	2,669 00
Weyburn	53	1,429	173	3,719½	.....	.....	673 75
Yorkton	36	1,128½	126	1,972	30	415	480 10
Total	3,133	72,603	4,269	82,833	623	10,433	18,633 44
Previous Year	3,022	64,367	3,478	73,546	(Not	Known)	16,958 81

E. F. STEPHENSON,
Inspector of Crown Timber Agencies.

No. 30b.

WINNIPEG, MAN., May 21, 1915.

SIR,—I beg to enclose, herewith, the annual report in connection with the Winnipeg Crown Timber Office for the fiscal year ending on the 31st March, 1915.

Attached to the report are the following statements, viz.:—

Schedule "A," showing receipts from timber, grazing and hay permits on Dominion Lands.

Schedule "B," gives the names of berth-holders operating under licenses and the extent of such operations.

Schedule "C," shows the mills, including portable saw-mills operating under permits within the Winnipeg district.

In addition to the figures and information furnished in the above schedules, the following statement shows the quantity of timber which settlers were authorized to cut under permits on Dominion Lands:—

Number of free permits issued to settlers and others	1,090
Quantity authorized—	
Lumber (feet b.m.)	2,207,704
Building logs (lineal feet)	620,223
Roof poles	42,687
Fence rails	70,820
Fence posts	124,670
Cords of wood (including 40,000 cords to City of Winnipeg for charitable purposes)	57,241
Settlers' permits and others on which dues were paid	590
Lumber (feet b.m.)	637,454
Building logs (lineal feet)	1,900
Poles	499
Fence posts	16,992
Fence rails	345
Railway ties	15,000
Cords of wood	12,811
Telephone poles	55

CORDWOOD BERTHS.

Number of permits issued on cordwood berths	12
Authorizing the cutting of the following quantity of timber, viz.:—	
Cords of wood	2,000
Fence posts	4,500
Railway ties	6,000

PERMIT BERTHS.

Number of permits issued on permit berths	66
Authorizing the holders thereof to cut:—	
Cords of wood	44,430
Lumber (feet b.m.)	1,125,000

LICENSE BERTHS.

Number of permits issued on license berths	1
Authorizing the cutting of:—	
Fence posts	5,000
Total number of timber permits issued during the year, exclusive of school lands	1,759

During the year, fifty-one seizures were made, covering timber cut on Dominion Lands, as follow:—

Railway ties	60,990
Lumber (feet b.m.)	340,655
Fence posts	2,083
Cords of wood	701
Logs (lineal feet)	1,600

HAY PERMITS.

Number of hay permits issued on Dominion lands	642
Number of tons covered thereby	12,451

Respectfully submitted.

Your obedient servant,

ANDREW FREEMAN
Crown Timber Agent.

SCHEDULE A.—Statement of Receipts from Crown Timber Agency at Winnipeg for fiscal year ending March 31, 1915.

Month.	Bonus under License.	Ground Rent under License.	Royalty Dues under License.	Permit Fees, Dues and Rental	Seizures.	Total Timber	Grazing Land Rental.	Hay Permits, Fees and Dues.	Fire Guarding Fees.	Registration Fees.	Total.	Remarks.
1914.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	
April	500 00	1,653 72	2,679 49	1,430 37	641 25	6,904 83	44 52	641 70	.....	.....	7,591 05	
May	200 00	4,392 74	252 99	1,644 22	552 85	7,042 80	26 19	308 95	3 36	18 00	7,399 30	
June	.....	1,356 69	273 17	1,363 02	1,152 86	4,145 74	15 28	228 90	79 47	.....	4,469 39	
July	871 92	404 79	1,645 18	2,699 88	1,048 98	6,670 75	119 07	395 95	17 28	.....	7,203 05	
August	.....	436 85	449 51	1,420 74	976 13	3,283 23	22 90	87 50	53 84	6 00	3,453 47	
September	.....	252 20	127 81	1,022 24	20 88	1,423 13	31 25	28 10	.....	5 21	1,487 69	
October	.....	87 45	4,700 56	1,412 09	1,209 09	7,409 19	15 52	9 30	10 08	.....	7,444 09	
November	.....	.....	246 80	2,225 91	1 10	2,473 81	34 59	4 20	57 68	8 00	2,578 28	
December	.....	.....	2,622 41	3,085 50	89 79	5,797 70	23 89	.....	.....	.....	5,821 59	
1915.												
January	.....	11 85	1,972 37	1,533 91	.....	3,518 13	24 10	.....	.....	3 00	3,545 23	
February	.....	.....	459 05	2,223 73	54 16	2,736 94	21 66	.....	.....	6 00	2,764 60	
March	.....	10 24	4,087 86	1,023 51	84 30	5,205 91	4 30	30	.....	.....	5,210 51	
Totals	1,571 92	8,606 53	19,517 20	21,085 12	5,831 39	56,612 16	383 27	1,704 90	221 71	46 21	58,968 25	
Collected at Head Office												
1914.												
April	.....	.....	.....	0 25	.....	0 25	.....	.....	.....	.....	0 25	
May	.....	448 95	.....	.....	.....	448 95	1 25	.....	.....	.....	450 20	
June	.....	.....	.....	.....	.....	.....	3 20	10 00	.....	.....	13 20	
July	.....	25 00	.....	.....	.....	25 00	104 45	.....	.....	.....	129 45	
August	.....	.....	.....	.....	.....	.....	11 45	.....	.....	.....	11 45	
September	.....	.....	.....	.....	.....	.....	4 80	.....	.....	.....	4 80	
October	.....	.....	.....	0 25	.....	0 25	4 57	.....	.....	.....	4 82	
November	.....	.....	.....	25 00	.....	25 00	6 30	.....	.....	.....	31 30	
December	.....	.....	.....	.....	.....	.....	0·80	.....	.....	.....	0 80	

1915.												
January		25 00		0 25		25 00 0 25	1 25 0 04				26 25 0 29	
February												
March												
Totals		498 95		25 75		524 70	138 11	10 00			672 81	
Grand totals	1,571 92	9,105 48	19,517 20	21,110 87	5,831 39	57,136 86	521 38	1,714 90	221 71	46 21	59,641 06	

ANDREW FREEMAN,
Crown Timber Agent.

SCHEDULE B.—Showing the Saw-mills operating within the Winnipeg

No.	Mill Owner.	Location of Mill.	Berth No.	Kind of Power.
1	Bank of Ottawa	Prairie River	960	Steam
2	Burrows, T. A	Grandview	575	Steam
3	Canadian Bank of Commerce	Mafeking	1101	Steam
4	Caverly Bros	Sec. 17-38-28 W 1	1790	Steam
5	Dutton, W. P	Greenbush	1713	Steam
6	Frank & Shannon	Bad Throat River (not in operation).	546	Steam
7	Gunn, John	Point du Bois	1545	Steam
8	Jefferson, W. D	S.W. 30-23-1 E	1127	Steam
9	Moore, E. D	Riverton (not in operation)	1245	Steam
10	McArthur Co., Ltd., J. D	Lac du Bonnet	702	Steam
11	"		1189	
12	McArthur, Peter	Graves Point	824	Steam
13	"		1062	
14	"		1063	
15	McClure, J. H	Balmoral	924	Steam
16	McKenzie, Mann & Co	Chemong	1241	Steam
17	McLellan, Hillson & Rogers	Ruby Lake	964	Steam
18	National Trust Co	Birch River	571A	Steam
19	"	Fish Town Spur	986	Steam
20	"		992	Steam
21	"		1120	
22	Robinson, Wm	Black River	869	Steam
23	Red Deer Lumber Co	Barrows	92	Steam
24	"		823	
25	"		1282	
26	Shaw, Jas. & Thos	Greenbush	974	Steam
27	Svensson, Hallberg & Larson		1681	
28	Thorvaldson & Simpson	Icelandic River	1887	Steam
29	Union Bank of Canada	Sec. 15-25-4 E (not in operation.)	1685	Steam
30	Williams, W. J. F	N.W. 32-28-17-W 1	944	Steam

Agency under Government License for the fiscal year ending March 31, 1915.

Horse-Power.	Capacity. per 10 hours.	Species of Timber cut.	Lumber.		
			Manufactured Ft. B. M.	Sold Ft. B. M.	On hand Ft. B. M.
200	60,000	Spruce			668,277
450	125,000	Spruce, tamarack and poplar	437,678	947,050	88,909
150	60,000	Spruce and poplar		1,634,699	986,969
55–65	40,000	Spruce	874,655	1,041,686	979,930
2,500	50,000	Spruce	1,284,905	355,194	1,082,533
			2,700,000	1,957,258	742,742
60	12,000	Spruce			
100	20,000	Spruce		58,600	142,400
40	8,000	Spruce and tamarack		94,668	
45	10,000	Spruce			100,000
100	50,000	Spruce and tamarack			
			2,459,357	362,400	217,892
				1,977,085	destroyed by fire.
60	22,000	Spruce and tamarack		1,424,082	1,206,717
80	30,000	Spruce		216,000	150,150
100	40,000	Spruce	112,990	335,540	749,099
200	25,000	Spruce and tamarack	456,784	702,014	114,946
150	45,000	Spruce, tamarack and poplar	3,129,156	453,749	3,040,344
60	25,000		1,854,363	4,419,623	
				1,769,220	1,274,618
			2,520,666	1,196,200	1,324,466
100	30,000	Spruce	625,371	479,461	145,910
650	125,000	Spruce	4,002,712	5,564,217	4,299,813
			4,589,701	4,018,491	2,551,843
			2,082,131	2,082,131	
250	50,000	Spruce	1,388,356	2,341,296	489,473
		Spruce	4,011,218	565,338	3,445,880
35	12,000	Spruce	248,008	180,000	68,008
60	15,000	Spruce and tamarack			
17	45,000	Spruce	51,235	55,649	195,179
			32,829,286	34,231,651	24,066,098

SCHEDULE B.—Showing the Saw-mills operating within the Winnipeg

No.	Log Count.			Average per Log Ft. B. M.	Railway Ties.			Laths.	
	Logs cut.	Logs Manufactured.	Logs on hand.		Manufactured.	Sold.	On hand.	Manufactured.	Sold.
1	.....	.....	51,009	.....	.....	.....	.....	.....	.....
2	6,971	7,971	.....	54	.....	.....	.....	.....	.....
3	.....	.....	.....	.....	.....	.....	.....	.....	.....
4	20,142	20,142	.....	43	.....	.....	.....	.....	.....
5	.....	17,785	.....	72	35,666	35,666	.....	348,000	447,350
	.....	31,246	.....	86	.....	.....	.....	.....	.....
6	.....	.....	3,000	.....	.....	.....	.....	.....	.....
7	.....	.....	.....	.....	.....	2,850	9,281	.....	.....
8	.....	.....	.....	.....	.....	.....	.....	.....	.....
9	.....	.....	.....	.....	.....	.....	.....	.....	.....
10	60,767	.....	60,767	.....	.....	.....	.....	.....	.....
11	49,986	64,538	49,986	38	5,570	4,155			
	.....	.....	.....	.....	.....	1,415	destroyed	by fire.	
12	33,806	.....	42,663	.....	.....	.....	.....	.....	.....
	.....	.....	.....	.....	.....	406	.....	.....	.....
14	.....	.....	4,172	.....	.....	.....	.....	.....	.....
15	.....	.....	.....	.....	.....	.....	.....	.....	.....
16	.....	1,582	.....	71	17,833	17,833	.....	32,000	227,000
17	.....	.....	1,164	.....	.....	.....	.....	.....	946,500
									127,200
18	34,821	59,821	.....	52	.....	.....	.....	.....	.....
19	55,174	33,537	101,445	55	.....	.....	.....	2,242,704	2,109,329
20	.....	.....	.....	.....	.....	.....	.....	.....	.....
21	24,162	43,241	24,162	58	.....	.....	.....	.....	.....
22	.....	14,751	.....	42	.....	2,901	.....	.....	.....
23	.....	75,819	68,077	52	1,020	1,020	.....	1,928,150	4,262,550
24	.....	86,462	98,065	53	.....	.....	.....	2,197,900	3,084,800
25	.....	39,901	7,129	52	.....	.....	.....	1,015,950	1,015,950
26	.....	17,865	.....	77	.....	.....	.....	370,000	650,000
27	.....	52,712	.....	76	.....	.....	.....	1,030,000	563,150
28	.....	8,936	.....	27	.....	.....	.....	.....	.....
29	.....	.....	1,000	.....	.....	.....	.....	.....	.....
30	2,487	1,987	500	26	.....	.....	.....	.....	.....
	288,316	578,296	513,139	.....	60,089	66,240	9,281	9,164,704	13,433,829

Agency under Government License for the fiscal year ending March 31, 1915.

Shingles.						
On hand.	Manufactured.	Sold.	On hand.		Date of last Return.	Remarks.
.....	.....	.....	.....	.....	4 31 March '15	Operated by Shaw Bros., Dauphin.
.....	.....	.....	.....	.....	4 "	
.....	.....	.....	.....	.....	5 "	Operated by Hutchenbacker Bros., Mafeking.
.....	.....	.....	.....	.....	4 "	
.....	.....	.....	.....	.....	4 "	Operations by Licenses.
.....	.....	.....	.....	.....	4 "	Operations by McKenzie, Mann & Co., Winnipeg.
.....	.....	.....	.....	.....	4 "	
.....	.....	.....	.....	.....	4 "	
.....	.....	.....	.....	.....	4 "	Now cancelled.
.....	.....	.....	.....	.....	4 "	
.....	.....	.....	.....	.....	4 "	
.....	.....	.....	.....	.....	4 "	
.....	.....	.....	.....	.....	4 "	
.....	.....	.....	.....	.....	4 "	
.....	.....	.....	.....	.....	4 "	Now cancelled.
.....	.....	.....	.....	.....	4 "	Operated by W. P. Dutton, Winnipeg.
.....	.....	.....	.....	.....	4 "	
65,000	.....	.....	.....	.....	.....	
.....	.....	.....	.....	.....	4 31 March '15	
133,375	.....	.....	.....	.....	4 "	
.....	.....	.....	.....	.....	4 "	Operated by T. A Burrows, Grandview, Man.
.....	.....	.....	.....	.....	4 "	
173,550	.....	.....	.....	.....	4 "	
96,550	.....	.....	.....	.....	5 "	
.....	.....	.....	.....	.....	4 "	
.....	.....	.....	.....	.....	4 "	Operated by W. P Dutton, Winnipeg.
466,850	.....	.....	.....	.....	4 "	Operated by W. P. Dutton, Winnipeg.
.....	.....	.....	.....	.....	4 "	
.....	.....	.....	.....	.....	4 "	Operated by W. H. Sparrow, Winnipeg.
.....	81,000	20,000	61,000	.....	4 "	
935,325	81,000	20,000	61,000	.....	.....	

SCHEDULE C.—Showing the Mills (including the Portable Mills) operating within March

No.	Mill Owner.	Location of Mill.	Berth No.	Species of Timber cut.	LUMBER.	
					Manufactured. Ft. B. M.	Sold Ft. B. M.
	Portable Sawmill Berths.					
1	Andrejczuk, M.	S E 7-33-21 W 1	2048	Spruce		22,240
2	Attwood, E. E.	N E 3-37-24 W 1	2022	Spruce	28,550	18,550
3	Boily, P. E.	N W 31-6-11 E 1	2181	Spruce, tamarack and Jack pine.	82,076	29,388
4	Bouvier, E.	S E 6-24-1-W 1	2019	Spruce		63,972
5	Brisebois, Louis	N W 15-1-13 E 1	2158	Spruce	20,500	20,500
6	Butson, W. F.	S E 28-39-25 W 1	2119	Spruce	75,017	30,272
7	Cockerill, Chas.	24-27-27 W 1	1740	Spruce and tamarack.	22,166	79,155
8	Cote, David	S W 3-6-10 E 1	2135	"	105,943	113,943
9	Danard, R. R.	S E 36-36-26 W 1	2185	"		
10	Dixon, Robt.	S W 29-27-14 W 1	2055	Poplar	14,170	14,000
11	Emarson, G. O.	N W 35-21-2 E 1	2004	Spruce		37,000
12	Fennison, Sig.	S W 33-24-3 E 1	2162	Spruce, tamarack and poplar.	40,000	20,000
13	Hale, Erick	24-18-18 W 1	1755	Spruce		70,000
14	Hawke, M. S.	Pannock, Sask.	1884	"	123,680	186,941
15	Hawkins, J. A.	N W 3-35-26 W 1	2002	"		49,709
16	Heale, W. G.	Teulon, Man.	2096	"	125,000	90,000
17	Herron, Henry	N W 3-41-25 W 1	2133	Spruce and tamarack	225,000	47,100
18	Hunter, J. D	Fisher's Siding, Man.	2131	Spruce	42,252	39,179
19	Johnston, Geo.	25-20-1 W 1	2197	Spruce and tamarack.	36,100	10,000
20	Jefferson, F. J.	N E 9-22-1 E 1	2103	Spruce, tamarack and poplar.	25,080	
21	Loewen, C. T.	6-7-10 E 1	2176	Spruce, tamarack, pine and cedar.	150,000	150,000
22	Marshall, John	17-23-11 W 1	2007	Spruce and poplar	210,000	178,773
23	Matheson, W. H.	31-26-5 W 1	2200	Spruce and tamarac	75,804	20,886
24	Matheson, W. H.	"	2112	"		68,262
25	McClure, A. E.	N W 14-25-3 W 1	2171	Spruce	25,687	13,687
26	McKay, Colin		2129	"		59,726
27	McKay, Colin	S W 15-38-25 W 1	2203	Spruce and tamarack.	34,580	4,937
28	McNabb, W. A.	NE 36-38-28 W 1	1931	Spruce	125,000	55,000
29	Neault, Albert	NW 17-24-15 W 1	2189	"	29,569	9,072
30	Parkinson, J. F.	S E 30-39-25 W 1	2100	Black poplar and spruce.		41,235
31	Parkinson, Wm.	S E 30-39-25 W 1	2011	Black poplar and spruce.		61,591
32	Poitras, Pierre	26-4-11 E 1	2092	Spruce	46,597	46,597
33	Ralph & Palmatier	5-38-9 W 2	2078	"	37,135	70,058
34	Rushoy & Anderson	Kilkenny, Man.	2193	"	25,250	6,200
35	Sigurdson, Job	Icelandic River	2149	"	75,000	75,000
36	Sigurdson, Sig.	28-22-1 E 1	2177	"	60,000	
37	Silver, Dan.	Marble Ridge, Man.	2012	Spruce and tamarack	287,600	154,000
38	Steenerson, Ingd	N E 34-35-7 W 2	1934	Poplar		15,700
39	Therrien, Hon.	N W 15-8-10 E 1	2121	Spruce, tamarack and jack pine.		41,882
40	Thowaldson, S.	28-22-1 E 1	1911	Spruce, tamarack and poplar.		60,500
					2,147,756	2,075,055

the Winnipeg Agency, under Government Permits, for the fiscal year ending 31, 1915.

Log Count.					Date of Last Return.	Remarks.
On Hand Ft. B. M.	Logs Cut.	Logs Manufactured.	Logs on Hand.			
.....	.....	447	5	.....	3 31 Dec., '14	Cancelled.
		written off 6				
12,722	855	585	270	48	3 31 Mar., '15	Cancelled.
52,688	2,768	2,768	.....	29	1 "	
96,150	.....	.....	.....	.....	4 "	Cancelled.
.....	683	683	.....	30	1 30 June, '14	Cancelled.
44,745	2,183	2,183	.....	34	4 31 Mar., '15	Cancelled.
.....	.....	665	.....	33	1 17 Sept., '14	Cancelled.
.....		3,755	Destroyed by fire.			
.....	3,720	3,720	.....	28	4 31 Mar., '15	
.....	1,937	.....	1,937	.....	1 "	
18,900	.....	348	.....	40	4 "	Cancelled.
.....	.....	.....	.....	.....	4 "	Cancelled.
20,000	1,300	1,300	.....	30	4 "	
.....	.....	.....	.....	.....	1 30 June, '14	Cancelled.
.....	.....	1,000	.....	123	3 31 Dec., '14	Cancelled.
160,733	.....	.....	.....	.....	4 31 Mar., '15	Cancelled.
35,000	1,042	4,000	1,900	31	4 "	Cancelled.
215,541	6,027	4,827	1,200	46	4 "	
5,073	763	438	545	96	4 "	Cancelled.
26,100	800	739	61	48	1 "	
25,080	600	675	.....	37	4 "	Cancelled.
.....	3,902	3,902	.....	38	2 "	
66,227	6,997	6,997	.....	30	4 "	Cancelled.
54,918	1,317	1,317	.....	57	1 "	
.....	.....	.....	.....	.....	4 "	Cancelled.
12,000	2,872	412	2,460	62	2 "	
.....	.....	.....	.....	.....	3 31 Dec., '14	Cancelled.
29,463	545	545	.....	63	1 31 Mar., '15	
875,520	38,311	41,306	8,373			
126,000	4,108	2,684	1,424	46	4 31 Mar., '15	Cancelled.
20,497	2,636	1,598	1,038	19	1 "	
5,151	.....	.....	.....	.....	4 "	Cancelled.
53,498	.....	.....	.....	.....	4 "	Cancelled.
.....	1,550	1,550	.....	30	3 31 Dec., '14	Cancelled.
.....	.....	495	.....	75	2 30 Sept., '14	Cancelled.
19,050	1,026	655	371	38	1 31 Mar., '15	
.....	.....	2,500	.....	30	4 10 Mar., '15	Cancelled.
60,000	1,550	1,550	.....	38	1 31 Mar., '15	
133,600	4,144	10,564	2,548	27	4 "	Cancelled.
14,653	.....	.....	.....	.....	4 "	Cancelled.
.....	.....	.....	.....	.....	1 30 June, '14	Cancelled.
.....	.....	.....	.....	.....	1 "	Cancelled.
1,307,969	53,325	62,902	13,754			

SCHEDULE C.—Showing the Mills (including the Portable Mills) operating within March

No	Mill Owner.	Location of Mill.	Berth No.	Species of Timber cut.	LUMBER.	
					Manufactured. Ft. B. M.	Sold Ft. B. M.
	Permit Berth.					
1	Caverly, Jeff	Porcupine Mtn.	966	Spruce and tamarack.	752,275	1,471,696
2	Laurie, J. E	35-10-10 E 1	1975	Spruce	.....	16,000
3	McArthur, C. L. J. D	Lac du Bonnet, Man.	702	"	.....	.....
4	"	"	1543	"	.....	154,263
5	"	"	1942	"	.....	430,351
						1,191,441
6	Robinson, Wm	Humbug Bay, Man.	830	"	120,000	641,285
7	Saskatoon Lumber Co	Mistatim, Sask.	1817	"	.....	.....
8	Tholimet, L	30-29-13 W 1	1814	"	33,000	33,000
					905,275	3,938,036

the Winnipeg Agency, under Government Permits, for the Fiscal Year ending 31, 1915.

Log Count.						
On Hand Ft. B. M.	Logs Cut.	Logs Manufactured.	Logs on Hand.		Date of Last Return.	Remarks.
1,723,364	13,501	13,501	.....	55	4 31 Mar., '15	
10,200	.....	.....	.....	.....	4 "	
.....	61,542	.....	61,542	.....	4 "	
.....	.....	.....	.....	.....	4 "	
Destroyed by fire.						
.....	.....	2,000	.....	60	4 "	
.....	.....	.....	8,320	.....	1 30 June, '14	Cancelled.
.....	.....	1,000	.....	33	1 "	Cancelled.
1,733,564	75,043	16,501	69,862			

ANDREW FREEMAN,

Crown Timber Agent.

No. 30c.

SCHEDULE A.—Statement of Receipts from Crown Timber Agency at Edmonton, for Fiscal Year ending March 31, 1915.

Month.	Bonus under License.	Ground Rent under License.	Royalty Dues under License.	Permit Fees, Dues and Rental.	Seizures.	Total Timber.	Hay Grazing Land Rental.	Permits, Fees and Dues.	Fire-guarding Fees.	Registration Fees.	Total.	Remarks.
1914.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
April		114 55	1,375 77	1,417 46	86 10	2,993 88		574 50	22 41		3,590 79	
May		1,508 04	8 88	3,097 98	59 60	4,674 50		165 40			4,839 90	
June		2,739 76	277 70	4,054 08	545 64	7,617 18		117 50	5 30	2 00	7,741 98	
July		125 52	2,058 14	1,301 96	96 54	3,582 16		95 45	3 34		3,680 95	
August		19 83	205 23	858 42	680 47	1,763 95	1 60	44 20			1,809 75	
September		62 98	4 16	1,568 37	71 75	1,707 26	1 60	9 45	18 91		1,737 22	
October	2,595 46	45 04	1,072 30	2,938 31	51 46	6,705 57	4 99	3 20	1 92		6,715 68	
November		294 42	36 30	990 86	831 93	2,153 51	56 90	1 10	72 58		2,284 09	
December		24	425 07	7,151 35	874 71	8,451 37	36 80	0 60			8,488 77	
1915.												
January	1,500 00	63 48	404 98	879 39	174 07	3,021 92	1 60	0 20			3,023 72	
February				3,386 47	91 36	3,477 83	0 30				3,478 13	
March		128 22	17 22	5,763 07	33 93	5,942 44	1 45			2 00	5,945 89	
Totals	4,095 46	5,102 08	5,885 75	33,407 72	3,600 56	52,091 57	105 24	1,011 60	124 46	4 00	53,336 87	
Collected at Head Office.												
1914.												
April							27 20				27 20	
May					1 84	1 84	131 70				133 54	
June		485 64				485 64		1 50			487 14	
July							0 80				0 80	
August							57 12				57 12	
September					305 00	305 00					305 00	
October												
November							6 40				6 40	
December												

1915.												
January						3 14	192 80				195 94	
February			3 14			25		10 00			10 25	
March				25								
Totals		485 64	3 14	25	306 84	795 87	416 02	11 50			1,223 39	
Grand totals	4,095 46	5,587 72	5,888 89	33,407 97	3,097 40	52,887 44	521 26	1,023 10	124 46	4 00	54,560 26	

A. NORQUAY,
Crown Timber Agent.

SCHEDULE D.—General Office Returns of the Crown Timber Agency, Winnipeg, for Fiscal Year ending March 31, 1915.

Particulars.	Number, etc	As compared with previous year. — Increase.	As compared with previous year. — Decrease.	Remarks.
Letters received	33,296	4,789		Including Land Office.
Letters written	39,010	4,328		No separate record kept.
Permits subject to dues issued	620		46	
Free permits issued	1,139	118		
Seizures made	51		236	
Mill returns received and verified	262		23	
Mills operating under Government license	20		3	
Mills operating under Government permits	43	1		
Quantity of lumber manufactured, under license (feet)	32,829,286		16,880,006	
Quantity of lumber manufactured, under license (feet)	32,254,566		19,159,337	1,977,085 ft. destroyed by fire.
Quantity of lumber on hand, under license (feet)	24,066,098		1,089,046	
Hay permits issued	642	109		

ANDREW FREEMAN,
Crown Timber Agent.

SCHEDULE B.—Showing the Mills operating within the Edmonton Agency, under Government License, for the Fiscal Year ending March 31, 1915.

No.	Mill Owner.	Location of Mill.	Berth No.	Species of Timber cut.	Lumber. Manuf'd Ft. B. M.	Lumber. Sold Ft. B. M.	Lumber. On hand Ft. B. M.	Log Count. Logs cut.	Log Count. Logs Manuf'd.	Log Count. Logs on hand.
1	D. R. Fraser & Co., Ltd.	Edmonton	302	Spruce and poplar	47	47	Nil	Nil	1	813
2	John Walter, Ltd.	"	887	" "	2,048	2,048	Nil	Nil	42	837
3	D. R. Fraser Co., Ltd.	"	956	" "	157,280	670,449	Nil	3,219	3,308	4
4	John Walter, Ltd.	"	956	" "	236,745	1,569,588	Nil	4,968	4,968	Nil
5	Edmonton Lumber Co., Ltd.	"	963	" "	442,637	442,637	Nil	Nil	9,259	7,055
6	John Walter, Ltd.	"	1008	" "	6,904	56,301	Nil	Nil	135	1,010
7	D. R. Fraser Co., Ltd.	"	1098	" "	359,298	2,106,280	1,353,314	6,939	7,633	19,537
8	Blain & McKelvey	Berth	1019	" "	527,520	129,069	440,618	Nil	17,584	Nil
9	Pheonix Lumber Co., Ltd	"	1031	" "	Nil	Nil	Nil	Nil	.....	Nil
10	Hislop & Goodridge	"	1088	Spruce	Nil	341,675	Nil	Nil	Nil	Nil
11	Phoenix Lumber Co., Ltd	"	1093	Spruce and pine	Nil	519,018	2,468,761	Nil	Nil	Nil
12	Phoenix Lumber Co., Ltd	"	1122	" "	Nil	Nil	Nil	Nil	Nil	Nil
13	Edmonton Lumber Co., Ltd.	Edmonton	1125	" poplar	1,644,056	1,074,965	2,781,809	36,990	34,164	30,796
14	Edmonton Lumber Co., Ltd.	"	1156	" "	403,857	403,857	Nil	10,952	8,315	10,997
15	D. R. Fraser & Co.	"	1160	" "	13,798	13,798	Nil	Nil	287	3,010
16	Lawrence Garneau	Berth	1172	" "	522,153	234,861	722,067	1,029	10,544	2,353
16	J. J. Anderson		1185	" "	Nil	34,539	221,682	Nil	Nil	Nil
18	John Walter, Ltd.	Edmonton	1211	" "	44,397	44,397	Nil	Nil	928	21,204
19	D. R. Fraser Co., Ltd.	"	1211	" "	5,393	5,393	Nil	Nil	115	1,600
20	John Walter, Ltd.	"	1242	" "	1,271,239	1,986,430	1,429,908	22,428	26,377	6,485
21	D. R. Fraser Co., Ltd.	"	1242	" "	896,174	529,204	538,485	18,092	18,582	562
22	Jasper Pk. Collcries, Ltd.	Berth	1279	" etc.	691,243	5,120	2,015,097	1,505	9,760	Nil
23	John Walter, Ltd.	Edmonton	1289	"	Nil	Nil	Nil	Nil	Nil	10,685
24	W. A. Charlton	Berth	1296	Tamarack and pine	436,231	338,758	97,473	28,556	6,700	21,856
25	Fred Meyer	"	1301	Spruce, etc.	Nil	1,020,893	44,249	Nil	Nil	2,928
26	John R. McIntosh	"	1320	"	500,000	81,742	440,141	Nil	8,500	4,014
27	A. Belcher	"	1330	Spruce and pine	251,300	249,970	144,258	Nil	5,530	46,861
28	A. Belcher	"	1331	" "	Nil	248,593	1,801,967	Nil	Nil	9,874
29	North West Lumber Co., Ltd.	"	1340	" "	703,850	Nil	703,850	Nil	14,077	Nil
30	W. H. Gibson	"	1343	Pine and poplar	639,490	753,002	116,214	3,936	24,468	5,164
31	John Walter, Ltd.	Edmonton	1353	Spruce and poplar	35	35	Nil	Nil	1	1,182
32	D. J. Dunn	Berth	1394	" "	Nil	34,432	170,126	Nil	Nil	Nil
33	John Walter, Ltd.	"	Unmarked logs	" "	158,798	158,798	Ni.	3,344	3,344	Nil
34	John Walter, Ltd.	"	1784	" "	2,697,005	388,997	2,332,541	Nil	55,624	5,970
35	Bell & McPhee	"	1919	Spruce, etc.	Nil	Nil	Nil	Nil	Nil	2,512
36	J. S. Watt	"	2150	Spruce and poplar	Nil	Nil	Nil	12,613	Nil	12,613
37	W. H. Waddell	"	2173	" "	Nil	Nil	Nil	Nil	Nil	Nil
					12,610,598	13,444,999	17,822,560	155,171	270,246	233,922

SCHEDULE B.—Showing the Sawmills operating within the Edmonton Agency under Government License, etc.—*Concluded.*

No.	Mill Owner.		Railway Ties.			Date of Last Return.	Sundries.	Laths.			Shingles.		
			Manufactur'd	Sold.	On hand.			Manufactr'd.	Sold.	On hand.	Manufactu'd.	Sold	On hand
	Average per Log Ft. B. M.					Number of returns made.							
1	D. R. Fraser & Co., Ltd.	47				1 31-12-14							
2	John Walter, Ltd.	49				1 "							
3	D. R. Fraser Co., Ltd.	47				1 "							
4	John Walter, Ltd.	48				1 "							
5	Edmonton Lumber Co., Ltd.	48				1 "							
6	John Walter, Ltd.	44				1 "							
7	D. R. Fraser Co., Ltd.	47				1 "		942,200	513,840	1,441,35			
8	Blain & McKelvey	30				4 31-3-15		60,000	6,500	53,500			
9	Phoenix Lumber Co., Ltd.		177	5,377	Nil	4 "							
10	Hislop & Goodridge					4 "							
11	Phoenix Lumber Co., Ltd.		Nil	2,047	Nil	4 "		Nil	303,150	372,600			
12			51,724	15,555			31,460 Nil						
13	Edmonton Lumber Co., Ltd.	48				1 31-12-14		632,800	357,300	307,150			
14	Edmonton Lumber Co., Ltd.	48				1 "							
15	D. R. Fraser & Co.	48				1 "							
16	Lawrence Garneau	50				4 31-3-15							
17	J. J. Anderson					4 "					127,750	105,750	22,000
18	John Walter, Ltd.	48				1 31-12-14							
19	D. R. Fraser & Co., Ltd.	47				1 "							
20	John Walter, Ltd.	48				1 "	372 372	Nil	118,000	25,000			
21	D. R. Fraser Co., Ltd.	48				1 "							
22	Jasper Pk. Colleries, Ltd.	71	Nil	Nil	208	4 31-3-15	Mfg. Mine props and ties. 37,000 2,568 Mine ties sold. 1,400						
23	John Walter, Ltd.					1 31-12-14							
24	W. A. Charlton	65	750	Nil	750	3 31-3-15	Mfg. 5,100 lin ft. Fence posts sold 5,100						
25	Fred. Meyer					4 "							
26	John R. McIntosh	59				3 31-12-14		10,000	700	19,550			
27	A. Belcher	45				4 31-3-15		Nil	52,500				
28	A. Belcher					4 "							
29	North West Lumber Co., Ltd	50				4 "							
30	W. H. Gibson	26				4 "							

31	John Walter, Ltd	35				1	31-12-14								
32	D. J. Dunn					3	"								
33	John Walter, Ltd	47				1	"								
34	John Walter, Ltd	48				1	"	Piling mfg. 783	Sold. 783	1,141,150	385,025	756,125			
								Fence posts mfg. 406 lin. ft.	Sold 406						
35	Bell & McPhee					4	31-3-15								
36	J. S. Watt					2	"								
37	W. H. Waddell		6,300	6,300	Nil	1	"								
		48	58,591	59,282	51,038	86				2,786,150	1,737,015	2,975,660	127,750	105,750	22,000

Piling mfg.	32,615
Piling sold	1,153
Fence posts lin. ft. mfg.	5,506
Fence posts lin. ft. sold	5,506
Mining props mig	37,000
Mining props sold	nil
Mining ties mfg.	3,568
Mining ties sold	1,400

A. NORQUAY,
Crown Timber Agent.

SCHEDULE C.—Showing the Sawmills (including portable mills) operating within the Edmonton Agency under Government License for the Fiscal Year ending March 31, 1915.

No.	Mill-Owner.	Location of Mill.	Berth No.	Kind of Power.	Horse Power.	Capacity per 10 hours.	Species of Timber cut.	Lumber.			Log Count.		
								Manufactured Ft. B. M.	Sold. Ft. B. M.	On hand Ft. B. M	Logs Cut.	Logs Manufactured.	Logs on hand.
1	John Zackowski	Berth	T.B. 1604	Steam	26	6,000	Spruce and poplar	Nil	134,546	Nil	Nil	Nil	Nil
2	Emil Baril	Riffe	1773	"	26	9,000	" "	Nil	67,812	134,089	Nil	Nil	Nil
3	J. B. Scofield	Berth	1792	"	25	8,000	" "	64,436	61,143	18,336	Nil	2,091	3,439
4	Emery Minard	Dewberry	1853	"	15	5,000	Spruce and jack pine	Nil	41,534	Nil	Nil	Nil	Nil
5	John Zackowski	Berth	1879	"	26	6,000	Spruce	19,350	39,554	314,135	Nil	601	Nil
6	Fred Meyer	Berth	1881	"	32	10,000	Spruce and tamarack	Nil	107,544	61,944	Nil	Nil	Nil
7	Perry Snyder	Berth	1885	"	17	7,000	Spruce and pine	Nil	56,356	87,019	Nil	Nil	Nil
8	P. Maisonneuve	Berth	1902	"	25	8,000	Spruce and poplar	23,600	36,834	288,727	Nil	400	Nil
9	Chas. M. Mearns	Berth	1921	"	30	9,000	Spruce and tamarack	79,010	85,914	47,389	Nil	1,180	Nil
10	A. W. DeH. Smith	Berth	1926	"	25	6,000	Spruce, etc	Nil	23,525	Nil	Nil	Nil	583
11	W. S. O. English	Spirit River	1930	"	25	8,000	Spruce and tamarack	139,432	139,432	Nil	Nil	6,000	Nil
12	The Athabasca Lumber & S. Co.	Athabasca	1936	"	28	10,000	Spruce	206,713	166,661	67,402	2,457	4,435	Nil
13	Wm. Brunelle	St. Paul De Metis	1937	"	28	10,000	Spruce and pine	306,452	164,534	580,702	Nil	10,775	275
14	Jas. A. Evans	Berth	1993	"	20	10,000	Spruce, etc	Nil	9,336	Nil	14,497	2,500	13,497
15	C. H. Ohrn	Berth	1995	"	25	6,000	Spruce, etc	178,506	224,069	109,179	3,000	3,000	Nil
16	Narcisse Dery	Berth	1996	"	20	8,000	Spruce, etc	68,530	49,536	113,091	Nil	1,139	Nil
17	Edwin J. Whitford	Pakan	1998	"	20	8,000	Spruce, etc	Nil	Nil	55,046	Nil	Nil	Nil
18	Gibbons & Brown	Berth	2013	"	12	3,000	Spruce	Nil	Nil	Nil	Nil	Nil	114
19	L. H. Adair	Lake Saskatoon	2017	"	20	4,000	Spruce and poplar	1,750	99,750	Nil	Nil	25	Nil
20	E. J. Dowsett	Berth	2021	"	25	6,000	Spruce and poplar	Nil	14,500	Nil	Nil	Nil	Nil
21	F. Leserrec	Shaftsbury	2037	"	28	7,000	Spruce and tamarack	51,896	29,141	22,755	Nil	850	Nil
22	Ft. McMurray Lumber Co	Ft. McMu'y	2039	"	22	4,000	Spruce	81,420	41,380	40,040	Nil	838	40
23	Rourke Bros	Lac Ste. Anne	2041	"	20	10,000	Spruce and poplar	Nil	249,683	Nil	Nil	Nil	Nil
24	Al. Johnston	Wapiti Riv	2042	"	25	7,000	" "	Nil	166,798	Nil	Nil	Nil	Nil
25	Peace Lumber Co. Ltd	Berth	2047	"	17	3,000	" "	100,919	54,501	46,418	Nil	1,000	Nil
26	St. Bernard Mission	Berth	2053	"	17	4,000	" "	172,638	170,671	28,386	Nil	2,892	2,108
27	Geo. Latimer	Berth	2057	"	15	9,000	Spruce and poplar	163,182	63,182	100,000	Nil	2,100	Nil
28	C. E. Hughes	Saddle lake	2065	"	15	8,000	" "	275,312	293,312	Nil	1,463	7,708	Nil
29	H. A. George	Berth	2094	"	15	8,000	Spruce and tamarack	615,353	273,981	341,372	7,152	10,552	Nil
30	Henry Roberts	Berth	2098	"	25	10,000	" "	12,267	15,922	56,797	2,000	187	2,000

SCHEDULE C.—Showing the Mills (including the Portable Mills) operating within the Edmonton Agency, under Government Permits, etc.—*Continued.*

No.	Mill-Owner.	Average per Log Ft. B.M.	Railway Ties.			Laths.			Shingles.			Number of Returns made	Date of Last Return.
			Manufactured.	Sold.	On hand.	Manufactured.	Sold.	On hand.	Manufactured.	Sold.	On hand.		
1	John Zackowski (2)											4	31-3-15
2	Emil Baril								Nil	54,000		4	"
3	J. B. Seofield	31										4	"
4	Emery Minard											4	"
5	John Zackowski	32										4	"
6	Fred Meyer											4	"
7	Perry Snyder											3	"
8	P. Maisonneuve	59							Nil	10,000		1	"
9	Chas. M. Mearns	67							Nil	17,750		4	"
10	A. W. DeH. Smith											4	"
11	W. S. O. English	23							70,000	70,000		4	"
12	The Athabasca Lumber & S. Co	46										1	"
13	Wm. Brunelle	28							350,000	268,000		4	"
14	Jas. A. Evans								1,490,000	849,000		4	"
15	C. H. Ohrn	59										4	"
16	Narcisse Dery	60										4	"
17	Edwin J. Whitford											3	31-12-14
18	Gibbons & Brown											4	31-3-15
19	L. H. Adair	70										3	31-12-14
20	E. J. Dowsett								Nil	62,750		3	"
21	F. Leserree	61							38,500	33,500		4	31-3-15
22	Ft. McMurray Lvmber Co	97										1	30 6-14
23	Rourke Bros											1	31-12-14
24	Al. Johnston								Nil	25,250		3	31-12-14
25	Peace Lumber Co., Ltd	101							22,000	22,000		4	31-3-15
26	St. Bernard Mission	60							34,000	17,000		4	"
27	Geo. Latimer	78										3	31-3-15
28	C. E. Hughes	36										1	30-6-14
29	H. A. George	58										2	31-3-15
30	Henry Roberts	66										4	"

SCHEDULE C.—Showing the Mills (including the Portable Mills) operating within the Edmonton Agency, under Government Permits, etc.—*Continued.*

No.	Mill Owner.	Location of Mill.	Berth No.	Kind of Power.	Horse Power.	Capacity per 10 hours.	Species of Timber cut.	Lumber.			Log Count.		
								Manufactured Ft. B. M.	Solid Ft. B. M.	On hand Ft. B. M.	Logs Cut.	Logs Manufactured.	Logs on hand.
31	Louis Lagasse	Berth	2115	Steam	20	5,000	Spruce and tamarack	Nil	56,000	60,043	Nil	Nil	Nil
32	Henry Climes	Paddle Riv	2116	"	20	5,000	Spruce and poplar	517,376	332,308	202,068	5,532	7,357	700
33	The Arganouts Ltd	Berth	2117	"	30	8,000	Spruce and tamarack	643	148,342	Nil	Nil	Nil	Nil
34	A. G. MacGregor	Berth	2128	"	20	4,000	" "	46,917	44,217	2,700	421	690	125
35	The Arganouts Ltd	Berth	2136	"	30	8,000	" "	356,988	139,648	217,339	15,787	13,367	10,270
36	Geo. C. Garnett	Berth	2144	"	20	5,000	" "	125,000	125,000	Nil	4,333	2,009	4,333
37	Thos. E. Cooke	Berth	2145	"	20	5,000	" "	743,000	319,153	423,847	11,776	14,200	Nil
38	F. J. Dodge	Berth	2146	"	15	6,000	" "	93,443	78,013	24,987	4,490	1,525	4,890
39	Magar & St. Germain	Berth	2151	"	15	8,000	" "	511,724	431,712	80,012	8,808	8,149	1,600
40	Territorial Agencies	Berth	2155	"	25	10,000	" "	70,435	78,335	Nil	1,326	1,326	Nil
41	A. G. Trelle	Lake Saskatoon	2156	"	20	6,000	" "	20,463	5,511	14,952	1,697	246	1,451
42	A. E. Drader	Lacombe	2160	"	20	6,000	Spruce and poplar	540,254	315,780	224,474	16,740	16,740	Nil
43	Ralph Harris	Peace River Crossing	2164	"	20	6,000	" "	86,360	86,360	Nil	876	876	Nil
44	Gray A. McPherson	High Prairie	2165	"	30	8,000	" "	110,000	104,537	5,463	2,000	1,100	900
45	Jas. L. Hownson	Swan River Settlement	2167	"	15	5,000	" "	69,926	13,008	56,918	1,323	1,323	Nil
46	Wm. Brunelle	St. Paul De Metis	2170	"	20	6,000	" "	Nil	Nil	Nil	13,877	Nil	13,877
47	Hudson Bay Co. Ltd	Fort McMurray	2172	"	25	10,000	" "	175,000	123,378	51,622	1,620	1,620	Nil
48	A. Tupper & R. C. Davidson	Athabasca	2178	"	20	5,000	" "	63,015	63,015	Nil	1,260	1,240	20
49	O. S. Radway	Radway C.	2180	"	15	4,000	" "	41,379	14,075	27,304	616	616	Nil
50	Emil Baril	Durlingville	2184	"	20	9,000	" "	231,000	3,000	228,000	5,253	4,953	300
51	H. C. Mortlett	Lumford	2183	"	15	5,000	" "	48,232	40,232	8,000	783	783	Nil
52	Wm. S. O. English	Spirit Riv	2190	"	25	8,000	" "	Nil	Nil	Nil	6000	Nil	6,000
53	Jos. E. Bellemare	Bonnyville	2192	"	15	5,000	" "	91,435	Nil	91,435	2,852	2,185	667
54	I. B. Oldham	Lake Saskatoon	2205	"	15	5,000	" "	Nil	Nil	Nil	1,400	Nil	1,400
55	C. E. Hughes	Saddle Lake	391	"	20	8,000	" "	Nil	Nil	Nil	3,330	Nil	3,330

SCHEDULE C.—Showing the Mills (including the Portable Mills) operating within the Edmonton Agency, under Government Permits, etc.—*Continued.*

No.	Mill-Owner.	Average per Log Ft. B. M.	Railway Ties.			Laths.			Shingles.			Number of Returns made.	Date of Last Return.
			Manufactured.	Sold.	On hand.	Manufactured.	Sold.	On hand.	Manufactured.	Sold.	On haad.		
31	Louis Lagasse											4	31-5-15
32	Henry Climes	70										4	"
33	The Arganouts, Ltd											2	30-9-14
34	A. G. MacGregor	68										2	"
35	The Arganouts, Ltd	26							384,000	328,000		4	31-3-15
36	Geo. C. Garnett	62							210,000	154,000		1	"
37	Thos. E. Cooke	52										4	"
38	F. J. Dodge	61										4	"
39	Magar & St. Germain	62							122,500	122,500		4	"
40	Territorial Agencies	53										4	"
41	A. G. Trelle	83										4	"
42	A. E. Drader	32							148,000	148,000		4	"
43	Ralph Harris	98										4	"
44	Gray A. McPherson	100										3	"
45	Jas. L. Hownson	52										3	"
46	Wm. Brunelle											2	"
47	Hudson Bay Co., Ltd	108										3	"
48	A. Tupper & R. C. Davidson	51										2	"
49	O. S. Radway	67										1	"
50	Emil Baril	47										1	"
51	H. C. Mortlett	61										1	"
52	Wm. S. O. English											1	"
53	Jos. E. Bellemare	42										1	"
54	I. B. Oldham											1	"
55	C. E. Hughes											1	"

SCHEDULE C.—Showing the Mills (including the Portable Mills) operating within the Edmonton Agency, under Government Permits, etc.—*Continued.*

No.	Mill-Owner.	Location of Mill.	Berth No.	Kind of Power.	Horse Power.	Capacity per 10 hours.	Species of Timber cut.	LUMBER.			LOG COUNT.		
								Manufactured Ft. B. M.	Sold Ft. B. M.	On hand Ft. B. M.	Logs Cut.	Logs Manufactured.	Logs on hand.
56	Mountain Pk. Cl. Co. Lts.	Timber sale	30	Steam			Spruce and tamarack	1,314,234	368,799	945,435	94,882	26,793	68,089
57	John Walter, Ltd.	Edmonton	1306	"	275	40,000	" "	4,385,580	14,517	4,380,331	Nil	90,410	26,080
58	John Walter, Ltd.	"	Spec. O in C	"			" "	2,646	11,721	1,706	Nil	63	15,574
59	John Walter, Ltd.	"	Pt. 148090				" "	352,619	335,235	340,564	Nil	7,311	16,681
60	John Walter, Ltd.	"	T. B. 1493				" "	94	Nil	94	Nil	2	1,023
61	John Walter, Ltd.	"	1486				" "	Nil	Nil	Nil	Nil	Nil	1,891
62	D. R. Fraser & Co., Ltd.	"	Pt. 140029	"	275	40,000	" "	Nil	648	Nil	Nil	Nil	526
63	John Walter, Ltd.	"	T. B. 1477	"	275	40,000	" "	Nil	116	Nil	Nil	Nil	1,023
64	D. R. Fraser Co. Ltd.	"	Pt. 148090	"			" "	1,505	2,844	1,110	Nil	32	310
65	J. Walter & D. R. Fraser.	"	T. B. 1497				" "	640	651	640	Nil	13	14,615
66	J. Walter & D. R. Fraser.	"	1487				" "	1,171	697	777	Nil	25	5,331
67	J. Walter, Ltd.	"	Pt. 140029				" "	5,989	8,985	4,028	Nil	118	6,359
68	D. R. Fraser Co., Ltd.	"	T. B. 1306				" "	1,673,009	7,829	1,669,290	Nil	34,583	8,658
69	Jos. Chabot.	Stocks	Pt. 382	"	15	4,000	" "	75,450	75,450	Nil	1,800	1,800	Nil
70	Jno. Zackowski on new Bth	Westlock	New berth	"	26	6,000	" "	64,280	21,000	43,280	2,007	2,007	Nil
							Totals	14,380,573	6,251,268	11,619,246	241,358	301,735	238,079

SCHEDULE C.—Showing the Mills (including the Portable Mills) operating within the Edmonton Agency, under Government Permits, etc.—*Continued.*

No.	Mill-Owner.	Average per Log Ft. B.M.	Railway Ties.			Laths.			Shingles.			Number of Returns made.	Date of Last Return.
			Manufactured.	Sold.	On hand.	Manufactured.	Sold.	On hand.	Manufactured.	Sold.	On hand.		
56	Mountain Pk. Cl. Co., Ltd	49										5	31-3-15
57	John Walter, Ltd	48				909,000	909,000					1	31-12-14
58	John Walter, Ltd	42										1	"
59	John Walter, Ltd	48	1,270	1,540	2,181							1	"
60	John Walter, Ltd	47										1	"
61	John Walter, Ltd											1	"
62	D. R. Fraser & Co., Ltd											1	"
63	John Walter, Ltd											1	"
64	D.R. Fraser Co., Ltd	47										1	"
65	J. Walter & D. R. Fraser	49										1	"
66	" "	47										1	"
67	J. Walter, Ltd	50										1	"
68	D. R. Fraser Co., Ltd	48				1,164,000	1,164,000					1	"
69	Jos. Chabot	42										1	"
70	Jno. Zackowski on new Bth	32										1	31-3-15
	Totals	56	1,270	1,540	2,181	2,073,000	2,073,000		2,869,000	2,181,750		180	

Certified correct,

A. NORQUAY,
Crown Timber Agent.

SCHEDULE D.—General Office Returns of the Crown Timber Agency, Edmonton for the Fiscal Year ending March 31, 1915.

Particulars.	Number, etc.	As compared with previous year. — Increase.	As compared with previous year. — Decrease.	Remarks.
Letters received	25,000			Large increase over last year but no separate count kept of letters written and received by this branch.
Letters written	30,000			
Permits subject to dues issued	474	41		
Free permits issued	1,855	248		
Seizures made	78		18	
Mill returns received and verified	586		40	
Mills operating under Government license	20			
Mills operating under Government permits	58	2		
Quantity of lumber manufactured, under license	12,610,598		13,266,180	
Quantity of lumber sold, under license	13,444,999	1,586,150		
Quantity of lumber on hand, under license	17,822,560		1,334,401	
Hay permits issued	447		88	

Certified correct,

A. NORQUAY,

Crown Timber Agent.

No. 30d.

CALGARY, June 2, 1915.

SIR,—I have the honour to enclose herewith the following statements for the twelve months ending the 31st of March, 1915:—

Schedule "B," showing the saw-mills within this Crown Timber Agency in operation under government license.

Schedule "C," showing saw-mills, including portable saw-mill berths, operating under permits.

Schedule "D," furnishing particulars in relation to the general work of the office.

I am unable to report any improvement in the lumber business over last year, no doubt the continued depression being caused to a considerable extent by the war. You will note that most of the operators have considerable stock remaining on hand, but of late appear to be, if anything, adding thereto by cleaning up the operations on the berths and bringing in all logs left from previous operations, apparently anticipating an improvement in the market in the near future.

Your obedient servant,

W. E. TALBOT,

Crown Timber Agent.

SCHEDULE A.—Statement of receipts from Crown Timber Agency at Calgary, Alberta, for fiscal year ending March 31, 1915.

Month.	Bonus under License.	Ground rent under License.	Royalty dues under License.	Permit fees, dues and rental	Seizures.	Total Timber.	Grazing land rental.	Hay permits, fees and dues.	Fire-guarding fees.	Registration fees.	Total.	Remarks.
	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	
1914												
April			1,187 68	47 02	13 76	1,248 46	66 69	19 40			1,334 55	
May		821 40	44 55	1,408 08	82 43	2,356 46	289 63	1 00			2,647 09	
June		1,521 74			6 00	1,527 74	711 04	50			2,239 28	
July		50 30	1,283 16	775 60		2,109 06	361 83	25 70			2,496 59	
August		70 60		32 25		102 85	65 60	7 50			175 95	
September		79 66	742 39	377 21		1,199 26	235 67	2 50			1,437 43	
October		110 05	1,119 71	632 97	10 00	1,872 73	109 15	2 20			1,984 08	
November		1 20	992 50	81 75		1,075 45	198 04				1,273 49	
December		25	53 25	69 15		122 65	1,007 06				1,129 71	
1915.												
January		71 80	366 20	172 61	31 83	642 44	197 56				840 00	
February		20 00	114 80	207 37	21 60	363 77	155 71				519 48	
March		121 22	836 96	92 84	116 45	1,167 47	857 39				2,024 86	
Totals		2,868 22	6,741 20	3,896 85	282 07	13,788 34	4,255 37	58 80			18,102 51	
Collected at Head Office.												
1914.												
April							193 00				193 00	
May		1,658 95				1,658 95	396 08	6 25			2,061 28	
June							1,169 31				1,169 31	
July							337 64				337 64	
August		695 07				695 07	410 94				1,106 01	
September							656 87				656 87	
October				25		25	248 57				248 82	
November							78 05				78 05	
December							1,330 03				1,330 03	

1915.											
January							224 39				224 39
February							166 12				166 12
March				25		25	217 41	7 00			214 66
Totals		2,354 02		50		2,354 52	5,428 41	13 25			7,796 18
Grand Totals		5,222 24	6,741 20	3,897 35		16,142 86	9,683 78	72 05			25,898 69

Certified correct.

W. E. TALBOT,
Agent Dominion Lands.

SCHEDULE B.—Showing the sawmills operating within the Calgary Agency under Government License for the Fiscal Year ending March 31, 1915.

Number.	Mill Owner.	Location of Mill.	Berth No.	Kind of Power.	Horse Power.	Capacity per 10 hours.	Species of Timber cut.	Lumber.			Log Count.		
								Manufactured.	Sold.	On hand.	Logs cut.	Logs Manufactured.	Logs on hand.
								Ft. B. M.	Ft. B. M.	Ft. B. M.			
1	Eau Claire and Bow River Lumber Co.	Calgary	468	Steam and electricity	325	50,000	Spruce	1,626,842	3,691,488	2,029,045	189,046	62,619	116,427
2	Eau Claire and Bow River Lumber Co.	Calgary	318 and 417	Steam and electricity	325	50,000	Spruce and pine	2,599,154	Nil	5,624,837	Nil	75,285	Nil
3	Lineham Lumber Co.	High River	579	Steam	45	50,000	Spruce	3,977,640	2,980,121	4,078,449	26,950	101,221	22,913
4	Frank R. Pettepher	Leslieville	" 1,079	" ..	50	6,000	Spruce and pine	1,006,048	602,935	832,757	7,395	21,110	4,245
5	Pennefather Grant and The Great West Lumber Co.	Red Deer	253	" ..	450	80,000	" "	910,910	537,177	2,484,076	Nil	16,110	126,071
6	McEwen & Carter	Red Deer	1,100	" ..	450	80,000	" "	706,047	708,688	653,119	Nil	12,908	141,097
7	Phoenix Lumber Co.	Grandview Man.	1,119	.....	.....	.....	" "	30,100	30,100	Nil	Nil	387	Nil
8	Valley Lumber Co.	Leslieville	1,216	Steam	35	30,000 to 40,000	" "	4,745,701	3,027,489	2,255,771	28,202	95,202	15,959
9	Vernon N. DeMille	Priddis	1,389	"	35	12,000	" "	Nil	Nil	10,500	Nil	Nil	2,688
10	Wm. C. McDougall	Leslieville	863	"	.....	.....	" "	Nil	37,695	Nil	Nil	Nil	Nil
11	Vernon N. DeMille	Priddis	1,218	"	35	12,000	" "	Nil	189,143	170,775	Nil	Nil	Nil
12	International Coal & Coke Co.	Coleman	2,073	.....	.....	.....	" "	Nil	Nil	Nil	7,483	7,483	Nil
13	Lineham Lumber Co.	High River	1,292	Steam	45	50,000	" "	Nil	Nil	Nil	23,754	Nil	96,257
14	Wm. A. Shields	Lacombe	1,246	"	30	25,000	" "	Nil	.....	.....	3,320	Nil	3,320
15	Hon. Peter McLaren	Blairmore	36A	"	100	30,000	" "	2,695,575	2,378,852	3,973,346	251	54,413	64,370
16	J. A. Card & Sons	Leslieville	1,040	"	35	10,000	" "	145,380	185,243	35,181	8,184	3,883	6,312
								18,443,397	14,368,931	22,147,856	294,585	453,621	599,659

SCHEDULE B.—Showing the Sawmills operating within the Calgary Agency under Government Licenses etc.—*Concluded.*

Number.	Mill Owners.	Average per log. Ft. B. M.	Railway Ties.			Laths.			Number of Returns made.	Date of Last Return.	Remarks.
			Manufactured.	Sold.	On hand.	Manufactured.	Sold.	On hand.			
1	Eau Claire and Bow River Lumber Co.	25·98							4	March 31, 1915	2,789 fence posts mfg'd.
2	Eau Claire and Bow River Lumber Co.	34·5							4	" "	1,181 fence posts mfg'd.
3	Lineham Lumber Co.	39·19				228,850	88,000	140,850	4	" "	7,912 fence posts mfg'd.
4	Frank R. Pettepher	41·72							4	"	
5	Pennefather Grant and The Great West Lumber Co.	56·5				189,750	136,925	52,825	4	" "	
6	McEwen & Carter	56·48				189,750	243,275	49,000	4	" "	
7	Phoenix Lumber Co.	77·0	3,086	36,586	Nil				4	" "	Lumber reported mfg'd and sold is approx. contents of 387 logs which have become rotten and useless.
8	Valley Lumber Co.	49·84							4	" "	
9	Vernon N. DeMille								4	" "	
10	Wm. C. McDougall								2	Sept. 30, 1914	No operations since this date.
11	Vernon N. DeMille								4	March 31, 1915	
12	International Coal & Coke Co.								4		Logs mfg'd into mine props and used by company.
13	Lineham Lumber Co.								4	" "	
14	Wm. A. Shields								4	" "	
15	Hon. Peter McLaren	49·52							4	" "	Log shortage of 17,889 pcs.
16	J. A. Card & Sons	37·44							4	" "	
		40·66	3,086	36,586	Nil	608,350	468,200	242,675			

Certified correct.

W. E. TALBOT,
Agent Dom. Lands.

SCHEDULE C.—Showing the Mills (including the Portable Mills) operating within the Calgary Agency under Government Permits, for the Fiscal Year ending March 31, 1915.

Number.	Mill Owner.	Location of Mill.	Berth No.	Species of Timber Cut.	Lumber.			Log Count.		
					Manufactured. Ft. B. M.	Sold Ft. B. M.	On Hand Ft. B. M.	Logs Cut.	Logs Manufactured.	Logs on Hand.
1	Geo. Cummings	Wittenburg	2120	Spruce and Pine	780,970	263,602	700,626	10,246	10,363	93
2	J. T. Johanneson	On Berth	2101	"	252,763	240,029	240,405	3,352	8,043	3,352
3	Chas. Stubbs	"	2000	Spruce	199,910	65,559	195,223	2,041	3,588	4,097
4	N. T. Hagen	"	1586	"	96,302	19,894	101,664	Nil.	2,787	Nil.
5	Richard Bros. Co., Ltd	"	2035	"	Nil.	17,289	Nil.	Nil.	Nil.	Nil.
6	Foothills Lumber Co	"	1938	Spruce and Pine	376,799	243,215	232,331	93	5,353	5,590
7	James P. McPherson	Bentley	1997	"	422,925	489,221	33,726	9,358	8,662	767
8	E. R. Baker	On Berth	2195	"	17,815	17,815	Nil.	2,754	316	2,438
9	Pelletier Lumber Co	Coleman	Sale No. 23.	"	1,776,598	1,881,503	150,722	22,898	37,715	9,932
10	Pelletier Lumber Co	"	Sale No. 23A	"	Nil.	Nil.	Nil.	15,157	Nil.	15,157
11	J. A. Burt	North Fork	Sale No. 27	"	47,700	34,699	13,001	546	1,322	824
12	Edward Mason	On Berth	Sale No. 31.	"	50,832	13,827	37,005	1,813	1,204	1,363
13	Chas. Schmidt		1916	"	Nil.	Nil.	Nil.	Nil.	Nil.	Nil.
14	Featherstone & Mason	On Berth	1610	Spruce	21,720	46,661	Nil.	Nil.	510	Nil.
15	Brazeau Collieries	Nordegg	Sale No. 34.	"	Nil.	Nil.	108,487	108,487	108,487	Nil.
16	Gus Lacoste		Sale No. 36.	"	Nil.	Nil.	23,453	23,453	23,453	Nil.
17	Brazeau Collieries	Nordegg	Sale No. 16.	"	71,980	69,638	25,462	25,713	25,462	Nil.
	Total				4,116,314	3,402,952	1,704,703	225,911	237,265	43,613

SCHEDULE C.—Showing the Mills (including the Portable Mills) operating within the Calgary Ageney under Government Permits, for the Fiscal Year ending Mareh 31, 1915—*Concluded.*

Number.	Mill Owner.	Average per log Ft. B. M.	Railway Ties.			No. of Returns made.	Date of Last Return.	Remarks.
			Manufactured.	Sold.	On hand.			
1	Geo. Cummings	75·36	Nil.	Nil.	Nil.	4	March 31, 1915	151,750 shingles manufactured.
2	J. T. Johanneson	31·42	Nil.	Nil.	Nil.	4	March 31, 1915	
3	Chas. Stubbs	55·71	Nil.	Nil.	Nil.	4	March 31, 1915	
4	N. T. Hagen	34·55	Nil.	Nil.	Nil.	4	March 31, 1915	1915 logs lost by being swept through booms.
5	Richard Bros. Co., Ltd	.....	Nil.	Nil.	Nil.	2	September 30, 1914	Berth cancelled.
6	Foothills Lumber Co	70·39	Nil.	Nil.	Nil.	4	March 31, 1915	
7	James P. McPherson	48 82	Nil.	Nil.	Nil.	4	March 31, 1915	
8	E. R. Baker	56·37	Nil.	Nil.	Nil.	1	March 31, 1915	
9	Pelletier Lumber Co	47·1	Nil.	Nil.	Nil.	4	March 31, 1915	314,447 ft.B.M. mine props manufactured and sold. 16,562 ft.B.M. cordwood manufactured and sold.
10	Pelletier Lumber Co	.....	Nil.	Nil.	Nil.	1	March 31, 1915	
11	J. A. Burt	36·08	Nil.	Nil.	Nil.	3	December 31, 1914	Returns for March 31, 1915, not received.
12	Edward Mason	42·22	Nil.	Nil.	Nil.	4	March 31, 1915	
13	Chas. Schmidt	.....	Nil.	Nil.	154	2	December 31, 1914	Cordwood Berth—Cancelled and not now operating.
14	Featherstone & Mason	42·60	Nil.	Nil.	Nil.	4	March 31, 1915	
15	Brazeau Collieries	.....	Nil.	Nil.	Nil.	2	March 31, 1915	
16	Gus Lacoste	.....	Nil.	Nil.	Nil.	2	March 31, 1915	
17	Brazeau Collieries	.....	Nil.	Nil.	Nil.	4	March 31, 1915	
	Total	51·54	Nil.	Nil.	154			Total by average does not include logs manufactured into mine timber.

Certified correct.

D. J. ROSE,
C. T. A.

SCHEDULE D.—General Office Return of the Crown Timber Agency, Calgary, for Fiscal Year ending March 31, 1915.

Particulars.	Number, etc.	As compared with previous year increase.	As compared with previous year decrease.	Remarks.
Letters received	111,265	24,604		
Letters written	92,333		7,600	
Permits subject to dues issued	79	38		
Free permits issued	234	52		
Seizures made	33	11		
Mill returns received and verified	219		4	Including Nil returns.
Mills operating under government license	16		1	
Mills operating under government permits	17		4	
Quantity of lumber manufactured, under license	18,453,202		2,009,805	
Quantity of lumber sold, under license	14,368,931		2,214,907	
Quantity of lumber on hand, under license	22,147,856	5,013,818		
Hay permits issued	340	24		

Certified correct.

W. E. TALBOT,
Agent Dom. Lands.

STATEMENT showing number of hay permits issued on Dominion Lands at the Calgary agency during the Fiscal Year ending March 31, 1915.

Number of permits	35
Number of tons	651

Certified correct.

W. E. TALBOT,
Agent Dominion Lands.

SCHEDULE G.—Statement showing Quantity of Timber cut under Permits at the Calgary Agency during the Fiscal Year 1914-15.

Month.	Lineal Feet Bldg. Logs.	Feet B. M. Lumber.	Roof Poles.	Fence Rails.	Fence Posts.	Dry Cord Wood.	Mining Timber Lineal Feet.	Mining Timber B. M.	Number of Permits issued.
1914.									
April	.....	10,000	.....	.....	500	10	.....	.....	3
May	3,000	.....	75	2,000	300	17	300,000	.....	4
June	.....	.....	.....	.....	.....	.....	.....	.....	.....
July	600	8,000	.....	1,000	400	10	.....	.....	2
August	.....	.....	.....	376	400	25	.....	.....	2
September	4,620	.....	550	1,650	350	37	.....	.....	9
October	13,300	9,250	1,000	4,400	2,700	106	.....	.....	12
November	14,450	5,000	1,875	6,550	2,000	95	.....	100,000	11
December	19,000	14,250	1,615	13,820	6,230	315	.....	.....	21
1915.									
January	7,000	235,209	1,450	8,500	7,240	351	.....	.....	25
February	16,224	243,356	3,670	14,800	8,150	489	.....	.....	67
March	30,825	31,139	3,440	18,540	6,845	220	.....	.....	41
Total	109,019	556,204	13,675	71,636	35,115	1,675	300,000	100,000	197

Certified correct.

W. E. TALBOT,

Agent Dom. Lands.

No. 30e.

PRINCE ALBERT, SASK., May 14, 1915.

SIR,—I beg leave to submit my report for the year ending the 31st March, 1915, in respect to the Crown timber work of this office. Nothwithstanding the very unusual conditions prevailing the past year the general volume of business transacted has materially increased. As compared with last year the number of permits subject to dues increased 274. Free permits increased 471. Forestry permits increased 374. I therefore conclude from the foregoing that more settlers are cutting timber in conformity with the regulations, and also that a large number of new settlers have come into the district the past year. On the other hand the very great decreases in the quantity shown of lumber manufactured, and sold and the increase on hand is accounted for by the financial depression prevailing.

Your obedient servant,

D. J. ROSE,

Crown Timber Agent.

SCHEDULE A.—Statement of Receipts from Crown Timber Agency at Prince Albert for Fiscal Year ending March 31, 1915.

Month	Bonus under License.	Ground Rent under License.	Royalty Dues under License.	Permit Fees, Dues Rental.	Seizures.	Total Timber.	Grazing Land Rental.	Hay Permits, Fees and Dues.	Fire-guarding Fees.	Registration Fees.	Total.
	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
1914.											
April		2,033 45	3,389 58	441 68	679 91	6,544 62	10 00	200 35	16 96		6,771 93
May		4,114 25		87 65	66 60	4,268 50		35 46	33 50		4,337 40
June	15 62			93 51		109 13		72 30			181 43
July	528 02		9,386 66	2,410 15	99 42	12,424 25		97 10			12,521 35
August		7 50		89 45	12 00	108 95		17 00			125 95
Septrmber	500 00			485 04	93 65	1,078 69		9 30		15 50	1,103 49
October			6,542 93	217 62	68 91	6,829 46	26 66	6 60			6,862 72
November			1,1345 09	515 00	241 88	12,101 97	3 20	0 20			12,105 37
December		608 79		753 40	34 82	1,397 01	91 00	0 70	36 92		1,525 63
1915.											
January		71 25	2,176 58	839 36	139 97	3,227 16	9 65	2 50			3,239 31
February				551 00	716 80	1,267 80	25 50				1,293 30
March				748 96	36 00	784 96	36 90				821 86
Totals	1,043,64	6,835 24	32,840 84	7,232 82	2,189 96	50,142 50	202 91	441 45	87 38	15 50	50,889 74
Collected at Head Office.											
1914.											
April							126 00				120 00
May		97 45				97 45	6 40				103 85
June							3 20				3 20
July							38 40				38 40
August											
September					73 21	73 21					73 21
October			2 25			2 25					2 25
November							8 60				8 60
December							96 15				96 15

1915.											
January							26 05				26 05
February		64 49				64 49					64 49
March		126 75				126 75	4 80				131 55
Totals		288 69	2 25		73 31	364 15	303 60				667 75
Grand totals	1,403 64	7,123 93	32,843 09	7,232 82	2,263 17	50,506 65	506 51	441 45	87 38	15 50 5	1,557 49

Certified correct.

D. J. ROSE,
C. T. A.

SCHEDULE B.—Showing the Saw-Mills operating within the Prince Albert, Sask., Agency under Government License for the Fiscal Year ending March 31, 1915.

Number.	Mill Owners.	Location of Mill.	Berth No.	Kind of Power.	Horse-power.	Capacity per 10 hours.	Species of Timber cut.	Lumber.			Log Count.		
								Manufactured.	Sold.	On hand.	Logs cut.	Logs Manufactured.	Logs on hand.
								Ft. B.M.	Ft. B.M.	Ft. B.M.			
1	Geo. Burn	Prince Albert	66a	Steam	1,200	160,000	J. pine & spruce	17,393,083	11,729,342	5,653,741	137,462	263,321	284,098
2	Geo Burn	"	474	"	1,200	160,000	"	2,984,828	.....	2,984,828	.....	39,895	161,712
3	Geo. Burn	"	633	"	1,200	160,000	"	6,533,803	.....	6,533,803	.....	96,722	74,826
4	Big River Lumber Co	Big River	1,049	"	1,600	200,000	"	.....	169,497	10,302,155	.....	.....	319,130
5	Saskatchewan Lumber Co., Ltd.	Crooked River	961	"	250	35,000	"	.....	4,140,918	1,958,859	.....	7,907	.....
6	Prince Albert Lumber Co., Ltd.	Prince Albert	868	"	1,200	160,000	"	.....	9,951,605	.....	.....	.....	.....
7	Prince Albert Lumber Co., Ltd.	"	801	"	1,200	160,000	"	4,316,592	504,693	3,811,899	.....	56,484	.....
8	Big River Lumber Co., Ltd	Big River	1,048	"	1,600	200,000	"	.....	.....	.....	.....	.....	.....
9	Finger Lumber Co., Ltd	The Pas	1,274	"	700	100,000	"	8,443,510	1,625,106	14,274,055	90,544	119,628	132,031
10	Finger Lumber Co., Ltd	"	920	"	700	100,000	"	8,507,920	12,023,605	2,921,702	147,342	118,252	134,090
11	Arthur Hitchcock	.....	1,158	"	.....	.....	"	115,989	111,166	88,000	53	2,629	9,835
12	Saskatchewan Lumber Co., Ltd.	Crooked River	1,640	"	250	35,000	"	.....	407,039	.....	.....	.....	.....
13	Pearse & Edworthy	Peesane	2,036	"	.....	.....	"	617,411	363,306	254,115	19,460	9,935	9,525
14	Saskatchewan Lumber Co., Ltd.	Crooked River	1,785	"	250	35,000	"	894,120	785,942	108,178	.....	14,902	.....
15	Ladder Lake Lumber Co., Ltd.	Big River	1,048	"	1,600	200,000	"	.....	.....	.....	.....	.....	959,397
16	Ladder Lake Lumber Co., Ltd.	"	1,049	"	1,600	200,000	"	.....	4,998,165	5,303,990	.....	.....	319,130
	Total	.....	.....	.....	.....	.....	.....	49,807,256	46,810,384	54,195,325	394,861	729,675	2,403,774

SCHEDULE B.—Showing the Saw-Mills operating within the Prince Albert, Sask., Agency under Government License for the Fiscal Year ending March 31, 1915.

Number.	Mill Owners.	Railway Ties.		Laths.			Fence Posts.		No. returns made	Date of Last Return.	Remarks.
		Sold.	On hand.	Manufactured.	Sold.	On hand.	Sold.	On hand.			
1	Geo. Burn			3,887,700	3,528,700	359,000			4	March 31, 1915	
2	Geo. Burn			642,750	624,200	18,550			4	"	
3	Geo. Burn			1,432,450	1,432,450				4	"	
4	Big River Lumber Co		2,853		5,350	246,300	1,000	790	4	"	16 cords wood sold and 297 cords on hand.
5	Saskatchewan Lumber Co., Ltd				63,675				4	"	
6	Prince Albert Lumber Co., Ltd				84,650				4	"	
7	Prince Albert Lumber Co., Ltd			922,550	922,550				4	"	
8	Big River Lumber Co., Ltd		98,896						4	"	35,560 ft. piling on hand.
9	Finger Lumber Co., Ltd				112,000	137,700			4	"	
10	Finger Lumber Co., Ltd			2,278,000	2,825,200	714,850			4	"	
11	Arthur Hitchcock								4	"	
	Saskatchewan Lumber Co., Ltd								4	"	
13	Pearse & Edworthy								4	"	2,245 ft. piling manufactured and sold.
14	Saskatchewan Lumber Co., Ltd			234,025	232,625	1,400		1,740	4	"	
15	Ladder Lake Lumber Co., Ltd								4	"	
16	Ladder Lake Lumber Co., Ltd				244,450	1,850	8	782	4	"	1,078⅝ cords wood manufactured, 886⅜ sold, 498¼ on hand.
	Total		101,749	9,397,475	10,075,850	1,479,650	1,008	3,312			

Certified correct.

D. J. ROSE,
Agent Dom. Lands.

SCHEDULE C.—Showing the Mills (including the Portable Mills) operating within the March

Number.	Mill Owner.	Location of Mill.	Berth No.	Species of Timber cut.	Lumber.		
					Manufactured Ft. B. M.	Sold Ft. B. M.	On Hand Ft. B. M.
1	Ross Bros.	Turtle Lake	1556	Spruce, etc.	.....	414	6,373
2	Geo. Garneau	30-51-4-3	1561	"	18,142	18,142	.....
3	P.A. Lumber Co., Ltd.	Prince Albert	765	"	1,220,222	1,220,222	.....
4	P.A. Lumber Co., Ltd.	"	1209	"	336,254	336,254	.....
5	Shell River Lumber Co.	"	876	Jack Pine, etc	.....	.....	.....
6	Hornseth & Jacklin	Ravine Bank	2075	Spruce	122,062	145,707	85,872
7	H. R. Kundson	E½ 25-40-15²	1630	"	.....	13'127	37,945
8	R. E. Smythe	Aldina	1627	"	4,340	21,699	4,405
9	P.A. Lumber Co., Ltd.	Prince Albert	1840	"	1,547,706	1,547,706	.....
10	E. R. Person	Onion Lake	1855	"	.....	.....	143,248
11	Warren Shaw	5-43-11-2	1905	"	163,560	236,204	171,256
12	Andrew Nugent	S.E. 29-49-22²	1903a	"	24,709	30,301	5,283
13	Nicholas Nelson	N.W. 15-40-14²	147S.L.	"	.....	32,000	.....
14	J. B. Albert	N.E. 18-50-27²	2059	"	250,000	13,051	236,949
15	A. L. Brown	St. Walburg	2058	"	117,657	127,971	.....
16	Chas. Shaw	N.E. 5-43-11-2	2049	"	.....	.....	27,600
17	Frank L. Smyth	.....	2038	"	26,115	4,630	21,485
18	Jos. S. Spitza	E½ 14-54-25³	2088	"	.....	102,773	.....
19	Mrs. Chas. Hemmelgarn	E½ 16-50-22³	2087	"	82,423	182,723	.....
20	Robt. J. Schwartz	S.W. 15-50-8-2	2089	"	48,665	23,915	30,110
21	J. H. Barnum	N.E. 25-45-12²	2095	"	.....	50,700	39,300
22	H. N. Egeland	28-51-5-3	2130	"	215,000	190,043	33,257
23	Theo. Nadon	S.W. 33-55-21³	2148	"	40,908	41,219	.....
24	Jos. Otte	Canwood	2157	"	.....	.....	.....
25	Leonard Hodgson	22-40-14-2	2199	"	103,462	72,572	30,891
26	A. H. Cunningham	Ravine Bank	2201	"	50,000	4,000	46,000
27	A. L. Brown	St. Walburg	2202	"	62,450	34,335	28,115
28	Jos. S. Spitza	S.W. 13-55-25-3	2198	Spruce, etc.	86,420	11,730	74,690
29	W. H. Asselstine	12-49-11-2	2174	"	185,275	96,148	89,127
30	Andrew Jacobsen	W½ 8-53-16-3	Not yet designated...	"	.....	.....	.....
	Total	.....	.....	.....	4,705,370	4,557,586	1,111,906

SESSIONAL PAPER No. 25

Prince Albert Agency, under Government Permits, for the Fiscal Year ending 31, 1915.

Log Count.			Cordwood.			No. of Returns made.	Date of Last Return.	Remarks.
Logs Cut.	Logs Manufactured.	Logs on Hand.	Manufactured.	Sold.	On hand.			
.....	.....	.....	.....	.....	.....	4	Mar. 31, 1915.	
.....	.....	.....	.....	.....	.....	1	June 30, 1915..	
2,704	15,967	2,704	.....	.....	.....	4	Mar. 31, 1915.	260,750 ft. lath manufactured and sold.
4,400	4,400	.....	.....	.....	.....	4	" 31, 1915	
.....	.....	2,000	.....	3 80	2,103	3	Dec. 31, 1914.	
2,544	2,544	.....	.....	.....	.....	4	Mar. 31, 1915..	292 lin. ft. piling sold.
.....	.....	.....	.....	.....	.....	4	" 31, 1915..	
.....	102	.....	.....	.....	.....	4	" 31, 1915..	
.....	22,035	16,302	.....	.....	.....	4	" 31, 1915..	91,850 ft. lath manufactured and 347,550 ft. sold. .....
.....	.....	.....	.....	.....	.....	3	Dec. 31, 1914..	
.....	3,839	125	.....	.....	.....	4	Mar. 31, 1915..	
.....	524	997	.....	.....	.....	4	" 31, 1915..	
.....	.....	.....	.....	.....	.....	3	Dec. 31, 1914..	
450	3,220	1,000	.....	.....	.....	3	" 31, 1914..	
.....	4,522	.....	.....	.....	.....	4	Mar. 31, 1915..	
870	.....	870	.....	.....	.....	4	" 31, 1915..	
.....	880	1,470	.....	.....	.....	4	" 31, 1915..	
.....	.....	.....	.....	.....	.....	2	Sept. 30, 1914.	
.....	3,265	.....	.....	.....	.....	3	Dec. 31, 1914..	60,000 shingles manufactured and sold.
.....	1,063	868	.....	.....	.....	3	" 31, 1914..	
.....	.....	.....	.....	.....	.....	4	Mar. 31, 1915..	
8,000	4,280	4,600	.....	.....	.....	4	" 31, 1915..	
200	957	.....	.....	.....	.....	1	June 30, 1914..	
234	204	45	48	16	32	4	Mar. 31, 1915..	811,000 shingles manufactured, 777,000 sold, 34,000 on hand.
2,173	2,173	.....	.....	.....	.....	1	" 31, 1915..	
490	490	.....	.....	.....	.....	1	" 31, 1915..	
2,546	2,020	526	.....	.....	.....	1	" 31, 1915..	
3,802	1,800	2,002	.....	.....	.....	1	" 31, 1915..	
3,344	3,344	.....	.....	.....	.....	2	" 31, 1915..	
4,441	.....	4,441	.....	.....	.....	1	" 31, 1915..	
36,198	77,629	37,950	48	396	2,135			

Certified correct.

D. J. ROSE,
Agent Dom. Lands.

SCHEDULE D.—General Office Return of the Crown Timber Agency, Prince Albert, Sask., for Fiscal Year ending March 31, 1915.

Particulars.	Number, etc.	As compared with previous year increase.	As compared with previous year decrease.	Remarks.
Letters received	27,947	Nil	1,059	
Letters written	40,966	7,777	Nil	
Permits subject to dues issued	464	274	Nil	
Free permits issued	1,533	471	Nil	
Seizures made	55	10	Nil	
Mill returns received and verified	153	Nil	215	
Mills operating under government license.	6	Nil	1	
Mills operating under government permits	28	Nil	Nil	
Quantity of lumber manufactured, under license	49,807,256	Nil	31,094,671	
Quantity of lumber sold under license	46,810,384	Nil	34,912,685	
Quantity of lumber on hand under license.	54,195,325	7,609,795	Nil	
Hay permits issued	382	109	Nil	

Certified correct.

D. J. ROSE,
Agent Dominion Lands.

No. 30f.

NEW WESTMINSTER, B.C., June 14, 1915.

SIR,—I submit herewith the annual report of this office, for the fiscal year ending the 31st of March last, and while regretting my inability to report any improvement in the lumbering industry over the preceding year, no apology would appear necessary, when consideration is given to the unsettled condition of the world at large, during the greater part of the period covered. It is felt, however, that with the close of the war, the lumbering industry in this province will receive an impetus which will result in a revival of business to such an extent as has not yet been reached. The profits for those engaged in lumbering have indeed been slight during the past year, but all are optimistic as to the future, and are in the meantime endeavouring to continue to operate in order to provide employment, which course is commendable.

Schedule ("A" (attached) shows the receipts as $72,032.14, an increase of $12,430.60 over the preceding year, to which please add a considerable amount collected at head office.

Schedule "B" gives the quantity of timber cut under license, being (48,063,455) feet board measure, an increase of (18,897,832) feet board measure over the preceding year, while the following figures indicate the quantity cut under the several other headings. On lands under homestead entry there was cut under permits issued from this office:—

118,522 feet board measure sawlogs.
7,993 7/12 cords of shingle bolts.
247 1/8 cords wood.
100 pieces fence posts.

On patented lands, which reserve the timber to the Crown, and which lands are being cleared for cultivation purposes, the following timber was cut:—

2,641,839 feet board measure sawlogs.
4,303 1/12 cords shingle bolts.
70 cords wood.
71,248 lineal feet piling and poles.
127 railway ties.

On vacant Dominion lands permits were issued to cut:—

3,482,090 feet board measure sawlogs.
1,638 cords shingle bolts.
15 cords wood.

The following timber was cut without authority, and trespass dues levied thereon:—

1,885,870 feet board measure sawlogs.
907 cords shingle bolts.
1,528 railway ties.
142,642 lineal feet piling.
297 cords wood.

Schedule "D" shows a general increase in the work of the office over the preceding year, and in this connection I may say that the small staff was taxed to their utmost to keep up the high standard maintained during previous years.

My assistant, Mr. Walmsley, continues to give me the benefit of his experience in the work, and the other members of the staff were most attentive and conscientious in the performance of their duties. All of which is respectfully submitted.

I have the honour to be, sir, your obedient servant,

E. W. BECKETT,
Crown Timber Agent.

SCHEDULE A.—Statement of Receipts from Crown Timber Agency at New Westminster for Fiscal Year ending March 31, 1915.

Month.	Bonus under License	Ground Rent under License	Royalty Dues under License.	Permit Fees, Dues and Rental.	Seizures.	Total Timber.	Grazing Land Rental.	Fireguarding Fees.	Total
1914.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
April		4,721 13	472 93	353 55	209 50	5,757 11		10 94	5,768 05
May		6,069 17	1,980 91	727 84	341 41	9,119 33			9,119 33
June	10,129 45	521 34	353 01	583 75	372 60	11,960 15			11,960 15
July		5,291 40	2,336 33	417 50	180 50	8,225 73			8,225 73
August			2,272 14	197 13	683 53	3,152 80		0 37	3,153 17
September			235 10	1,334 82	971 05	2,540 97	0 36		2,541 33
October	1,286 00	1,693 70	4,027 24	287 25	333 00	7,627 19			7,627 19
November		200 90	2,515 41	405 55	9 50	3,131 36			3,131 36
December			3,638 56	1,593 62	297 20	5,529 38			5,529 38
1915.									
January			2,122 54	420 07	561 15	3,103 76			3,103 76
February		19 15	434 41	973 45	2,469 91	3,896 92			3,896 92
March		2,797 06	2,110 23	3,043 12	25 00	7,975 41	0 36		7,975 77
Totals	11,415 45	21,313 85	22,498 81	10,337 65	6,454 35	72,020 11	0 72	11 31	72,032 14
Collected at Head Office:—									
1914.									
April		2 80				2 80			2 80
May		441 69				441 69			441 69
June							0 40		0 40
July		64 68				64 68			64 68
August		4 04			100 00	104 04			104 04
September		3 50				3 50			3 50
October									
November			1,291 62			1,291 62			1,291 62
December									
1915.									
January									
February									
March									
Totals		516 71	1,291 62		100 00	1,908 33	0 40		1,908 73
Grand totals	11,415 45	21,830 56	23,790 43	10,337 65	65,54 35	73,928 44	1 12	11 31	73,940 87

Certified correct.

E. W. BECKETT,
Crown Timber Agent.

SCHEDULE B.—Showing the Sawmills operating within the New Westminster, B.C.,

Numbers.	Mill Owner.	Location of Mill.	Berth No.	Kind of Power.	Horse Power.	Capacity per 10 hours.
1	Brunette Saw Mill Co., Ltd.	New Westminster	R. 33 (2) 452.	Steam	500	100,000
2	E. H. Heaps & Co., Ltd.	Ruskin	X. 33, 148, 185, 309, 314.	Electricity	750	150,000
3	Campbell River Lbr. Co., Ltd.	White Rock	B. "Q", 61.	Steam	700	125,000
4	Abbotsford Tbr. & Trading Co., Ltd.	Abbotsford	57, 81, 259.	"	500	100,000
5	M. B. King Lbr. Co., Ltd.	Surrey, B.C.	H.	"	200	35,000
6	Fernridge Lbr. Co., Ltd.	Rosedale, B.C.	"A".	"	200	35,000
7	Small & Bucklin Lbr. Co., Ltd.	New Westminster	537.	"	500	100,000
8	Rat Portage Lbr. Co., ILtd.	Vancouver, B.C.	302.			
9	Vancouver Power Co., Ltd.	No Mill.	"O".			
10	W. R. Spencer.	"	213, 556.			
11	John Oliver.	"	334.			
12	U. Tamaki.	"	494.			
13	J. D. Kennedy.	"	448, 464, 465.			
14	C. M. Marpole.	"	177.			
15	J. H. McLean.	Port Moody	485.	Steam	75	150,000
16	R. McNair.	"	38 and 535.	"	125	350,000
17	V. N. Spencer.	No Mill.	336.			
18	Pacific Shingle Co., Ltd.	Coquitlam	P. C. 286.	Steam	25	90,000
19	B. Willson.	No Mill.	361, 362.			
20	British Empire Trust Co.	"	106.			
21	G. E. Drew.	"	323.			
22	P. McCoy.	"	506.			
23	Franco-Canadian Lbr. Co., Ltd	"	55.			
24	H. B. Sullivan.	"	470.			

Agency, under Government License for the Fiscal Year ending March 31, 1915.

Species of Timber Cut.	Lumber.		Log Count.				Railway Piling and Poles Ties.		L. Ft. of	
	Manufactured.	Sold.	Logs cut.	Logs manufactured	Logs on hand.	Average per Log Ft. B.M.	Manufactured	Sold.	Manufactur'd	Sold.
	Ft. B. M.	Ft. B. M.				Ft. B.M.				
Fir, cedar, hemlock	8,290,904	8,290,904	9,980	9,762	218	849	650	650	.....	.....
" "	1,327,107	1,327,107	2,285	2,040	1,090	651	15,309	15,309	3,300	3,300
" "	5,059,900	5,059,900	6,683	6,683	Nil	757	.....	.....	.....	.....
" "	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
" "	7,082,060	7,082,060	13,791	13,791	Nil	506	.....	.....	16,284	16,284
" "	4,855,357	4,855,357	7,474	7,174	300	677	.....	.....	16,555	16,555
" "	2,633,170	2,633,170	5,758	5,548	210	457	.....	.....	.....	.....
" "	3,027,154	3,027,154	4,101	4,101	Nil	738	.....	.....	.....	.....
Fir	30,000	30,000	.....	.....	.....	.....	.....	.....	.....	.....
"	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Fir and cedar	168,277	168,277	280	280	Nil	601	.....	.....	.....	.....
" " "	19,329	19,329	106	106	Nil	182	114	114	17,428	17,428
Fir	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Fir and cedar	559,375	559,375	574	574	Nil	975	.....	.....	12,134	12,134
"	178,750	178,750	81	81	Nil	2,207	.....	.....	10,594	10,594
Cedar	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Fir, cedar, hemlock	2,881,483	2,881,483	4,306	3,306	1,000	872	522	522	Nil	.....
" "	509,585	509,585	1,150	1,150	Nil	443	.....	.....	24,385	24,385
Cedar	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Fir, cedar, hemlock	7,438,897	7,438,897	10,014	10,014	Nil	743	.....	.....	.....	.....
" "	3,920,293	3,920,293	6,669	6,669	Nil	588	.....	.....	.....	.....
Cedar	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Fir and cedar	81,814	81,814	126	126	Nil	649	.....	.....	.....	.....
Cedar	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Fir	.....	.....	.....	.....	.....	.....	.....	.....	16,745	16,745
	48,063,455	48,063,455	73,378	71,407	2,818	.....	16,595	16,595	117,425	117,425

SCHEDULE B.—Showing the Sawmills operating within the New Westminister, B.C., Agency under Government License for the Fiscal Year ending March 31, 1915—*Concluded.*

Number.	Mill Owner.	Shingle Bolts.			Number of Returns made.	Date of Last return	Cords of Wood.			
		Manufactured	Sold.	On hand			Cut.	Sold.	On hand.	Fence posts.
1	Brunette Saw Mill Co., Ltd.	207⅝	207⅝	Nil	12	Mar. 31, '15	167	167	Nil	.....
2	E. H. Heaps & Co., Ltd.	1,273½	1,313½	Nil	18	" "	.....	.....	.....	.....
3	Campbell River Lbr. Co. Ltd.	4,365¼	4,365¼	Nil	12	" "	191	191	Nil	.....
4	Abbotsford Tbr. and Trading Co., Ltd.	.....	.....	.....	12	" "	48	48	Nil	.....
5	M. B. King Lbr. Co., Lt.	.....	.....	.....	4	" "	.....	.....	.....	.....
6	Fernridge Lbr. Co., Ltd.	62½	62½	Nil	4	" "	.....	.....	.....	.....
7	Small & Bucklin Lbr. Co. Ltd.	.....	.....	.....	4	" "	167½	167½	Nil	.....
8	Rat Portage Lbr. Co., Ltd.	.....	.....	.....	4	" "	.....	.....	.....	.....
9	Vancouver Power Co., Ltd.	.....	.....	.....	4	" "	8	8	Nil	.....
10	W. R. Spencer	30	30	Nil	8	" "	.....	.....	.....	.....
11	John Oliver	130¾	130¾	Nil	4	" "	.....	.....	.....	393
12	U. Tamaki	.....	.....	.....	4	" "	387	217	170	.....
13	J. D. Kennedy	.....	.....	.....	12	" "	.....	.....	.....	.....
14	C. M. Marpole	.....	.....	.....	4	" "	.....	.....	.....	.....
15	J. H. McLean	Nil	Nil	25	4	" "	.....	.....	.....	.....
16	R. McNair	10,152	6,598	4,054	8	" "	54	54	Nil	.....
17	V. N. Spencer	.....	.....	.....	4	" "	.....	.....	.....	.....
18	Pacific Shingle Co., Ltd.	2,038	2,038	Nil	3	Permits....				
19	B. Willson	.....	.....	.....	8	Mar. 31, '15	.....	.....	.....	.....
20	British Empire Trust Co	.....	.....	.....	4	" "	.....	.....	.....	.....
21	G. E. Drew	553	553	Nil	4	" "	.....	.....	.....	.....
22	P. McCoy	.....	.....	.....	4	" "	.....	.....	.....	.....
23	Franco-Canadian Tbr. Co., Ltd.	20	20	Nil	4	" "	.....	.....	.....	.....
24	H. B. Sullivan	.....	.....	.....	4	.....	.....	.....	.....	.....
		18,832⅝	15,288⅝	.....	150	.....	1,022½	852½	170	393

E. W. BECKETT,
Crown Timber Agent.

SCHEDULE D.—General Office Return of the Crown Timber Agency, New Westminster, B.C., for Fiscal Year ending March 31, 1915.

Particulars.	Number, etc.	As compared with previous year increase.	As compared with previous year decrease.
Letters received	3,234	259	Nil.
Letters written	4,890	645	Nil.
Permits subject to dues issued	142	75	Nil.
Free permits issued	Nil.	Nil.	Nil.
Seizures made	24	Nil.	12
Mill returns received and verified	806	Nil.	42
Mills operating under government license	9	Nil.	Nil.
Mills operating under government permits	Nil.	Nil.	Nil.
Quantity of lumber manufactured, under license	48,063,455	18,897,832	Nil.
Quantity of lumber sold, under license	48,063,455	18,897,832	Nil.
Quantity of lumber on hand, under license	2,818	1,427	Nil
Hay permits issued	Nil.	Nil.	Nil.

E. W. BECKETT,
Crown Timber Agent.

No. 30g.

KAMLOOPS, B.C., May 20, 1915.

SIR,—I have the honour to inclose herewith the timber reports of this office, for the fiscal year ending the 31st of March, 1915, comprising schedules A, B and D.

By schedule A, you will notice that the total revenue derived from Timber and Grazing sources, during the above year, was $19,332.48, exclusive of the amount paid direct to the department at Ottawa.

The Timber and Grazing receipts for the preceding corresponding period were $50,653.40, constituting the almost unprecedented decrease of $31,320.92 in the Timber Branch for the twelve months ended the 31st of March, 1915, due to reasons that are apparent, without any explanation from me.

Schedules B and D show that 5,336,655 feet board measure of logs were cut during the past year, as compared with the cut of 83,818,023 for the year ended the 31st of March, 1914.

Part of this decrease may doubtless be attributed to the transfer of the east portion of this agency to Revelstoke, in which district the mills at Golden are now situated. This transfer would also account for the decrease in timber and hay permits.

With regard to the condition of the lumber industry at this moment, it may be said that a more hopeful view has recently been taken, in consequence of the bright crop outlook at the present time, and which, if justified, will in due time, mean an increased demand for lumber throughout this district and the Prairie Provinces.

Your obedient servant,

W. C. COWELL,
Agent.

SCHEDULE A.—Statement of Receipts from Crown Timber Agency at Kamloops, B.C., for Fiscal Year ending March 31, 1915.

Month.	Ground Rent under License.	Royalty Dues under license.	Permit Fees, Dues and Rental.	Seizures.	Total Timber.	Grazing Land Rental.	Hay Permits Fees and Dues.	Fireguarding Fees.	Registration Fees.	Total.
1914.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	cts.	$ cts.	$ cts.
April	.....	2,459 64	46 55	48 04	2,554 23	461 48	.....	.....	.....	3,015 71
May	708 60	277 35	49 02	169 82	1,204 79	299 22	3 00	16 36	6 00	1,529 37
June	70 11	2 10	69 92	8 16	150 29	129 98	1 00	.....	.....	281 27
July	10 57	3,066 85	64 95	187 65	3,330 02	507 47	3 00	294 52	2 00	4,137 01
August	737 65	1,823 54	13 75	.....	2,574 94	800 35	10 00	.....	.....	3,385 29
September	0 10	21 61	222 68	23 50	267 89	633 39	.....	10 41	2 00	913 69
October	.....	826 15	57 65	14 30	898 10	710 19	.....	.....	.....	1,608 29
November	.....	17 12	27 00	87 50	131 62	611 66	.....	.....	4 00	747 28
December	.....	0 68	39 50	277 71	317 89	596 78	.....	.....	....	914 67
1915.										
January	.....	39 23	103 10	49 98	192 31	540 62	.....	.....	2 00	734 93
February	.....	550 22	10 75	123 59	684 56	534 38	.....	.....	.....	1,218 94
March	96 90	.....	26 20	35 25	158 35	687 67	.....	.....	.....	846 02
Totals	1,623,93	9,084 49	731 07	1,025 50	12,464 99	6,513 19	17 00	321 29	16 00	19,332 47
Collected at Head Office.										
1914.										
April	7 06	.....	.....	.....	7 06	.....	.....	.....	.....	7 06
May	.....	.....	.....	.....	.....	52 06	.....	.....	.....	52 06
June	.....	.....	.....	.....	.....	47 02	.....	.....	.....	47 02
July	.....	123 56	.....	.....	123 56	54 25	.....	.....	.....	177 81
August	.....	.....	.....	.....	.....	181 43	.....	.....	.....	181 43
September	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
October	.....	.....	.....	.....	.....	116 19	.....	.....	.....	116 19
November	.....	.....	.....	.....	.....	3 20	.....	.....	.....	3 20
December	.....	.....	.....	.....	.....	31 97	.....	.....	.....	31 97
1915.										
January	.....	.....	.....	.....	.....	11 47	.....	.....	.....	11 47
February	.....	.....	.....	.....	.....	288 44	.....	.....	.....	288 44
March	.....	.....	.....	.....	.....	12 75	.....	.....	.....	12 75
Totals	7 06	123 56	.....	.....	130 62	798 78	.....	.....	.....	929 40
Grand totals	1,630 99	9,208 05	731 07	1,025 50	12,595 61	7,311 97	17 00	321 29	16 00	20,261 87

Certified correct.

W. C. COWELL,

Crown Timber Agent.

SCHEDULE B.—Showing the Saw-Mills operating within the Kamloops, B.C. Agency under Government License for the Fiscal Year ending March 31, 1915.

No.	Mill Owner.	Location of Mill.	Berth No.	Kind of Power.	Horse Power.	Species of Timber Cut.	LUMBER. Manufactured.	LOG COUNT. Logs Cut.	Railway Ties	Telephone Poles	Remarks.
							Ft. B.M.				
1	Okanagan Sawmills, Ltd....	Enderby....	238	Steam....	50 080 M	Fir, cedar, yellow white pine.	246,269	2,200	2,654	342	
2	E. G. Wallinder.....	Kamloops..	330	Portable .	.....	Fir, yellow pine.....	509,819	3,104	.....	.....	
3	Adams River Lumber Co...	Chase, B.C.	482	Steam....	800 175M	White pine, yellow pine, fir, cedar, spruce, poplar.....	4,580,567	60,397	.....	5,282	Portable sawmill used in connection with copper mine.
							5,336,655	65,701	2,654	5,624	

No Mills are operated within the Kamloops Agency under Government Permits

SCHEDULE D.—General Office Return of the Crown Timber Agency, Kamloops, for Fiscal Year ending March 31, 1915.

Particulars.	Number, etc.	As compared with previous year increase.	As compared with previous year decrease.
Letters received	Included with land office letters on general form No. 223.		
Letters written	Included with land office letters on general form No. 223.		
Permits subject to dues issued	77		47
Free permits issued	271		67
Seizures made	48	40	
Mill returns received and verified	280		516
Mills operating under government license	3		
Mills operating uader government permits			
Quantity of lumber manufactured, under license	5,336,655	83,818,023	78,481,368
Quantity of lumber sold, under license			
Quantity of lumber on hand, under license			
Hay permits issued	6		11

Certified correct.

W. C. COWELL.

Crown Timber Agent.

No. 30h.

Revelstoke, B.C., April 12, 1915.

Sir,—I beg to submit herewith a report of the work of the Revelstoke Crown Timber Agency for the year ended March 31, 1915.

Very little has been done in the way of cutting during the past year, owing to the fact that all the lumber companies have had very large stocks on hand for which there has been but little sale, owing to the extreme financial depression caused by the war. I am glad to report, however, that there is at present every indication of an improvement in the lumber market.

The matter of squatters within timber berths has received very careful attention, and whenever a case is found, the timber inspector immediately reports as to the exact location, as far as possible, of the land upon which the squatter is located. The company or person controlling the berth is then advised of the case and his attention to the clause in the license affecting these cases is brought to his notice. This system has met with very fair success, and it has the effect of educating the licensees to take a more active interest in the suppression of this troublesome practice.

Strict attention has been given to the matter of illegal cutting, inasmuch as it has practically ceased. Persons who have been making a practice of doing this are beginning to realize that it is more satisfactory to procure a permit and pay single dues than run a chance of having their timber seized and pay double dues, besides the publicity and inconvenience caused by a seizure.

The revenue derived from timber during the past year through this agency is not as large as might be expected when the area held under license is taken into consideration. This is, however, easily accounted for by the war and the financial condition caused thereby.

Inasmuch as this is the first year that this agency has been established, it is impossible to make a comparison of figures.

The attached forms show the business transacted as follows:—

Schedule A.—Revenue derived from Timber and Grazing Branch of this agency, $3,168.97.

Schedule B.—Covering 46,088 pieces of sawlogs, which scale into 6,112,968 feet board measure, British Columbia scale. In addition to this there was cut from licensed berths, 3,370 railway ties, 1,741 telephone poles, 13,508 fence posts, and 12 cords of cord-wood.

Schedule D.—General office return.

The average price for lumber during the past year has been $15.35 per thousand feet.

In conclusion, I beg to take this opportunity of thanking my staff, one and all, for the very able assistance that they have given me during the past year.

Your obedient servant,

T. J. WADMAN,

Crown Timber Agent.

SCHEDULE A.—Showing the Saw-Mills operating within the Revelstoke Agency under Government License for the Fiscal Year ending March 31, 1915.

Month.	Ground Rent under License.	Royalty Dues under License.	Permit Fees, Dues, and Rental.	Seizures.	Total Timber.	Grazing Land Rental.	Hay Permits, Fees and Dues.	Fire-guarding Fees.	Registration Fees.	Total.
1914	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
April			16 89	38 00	54 89					54 89
May	648 80		16 49		665 29			358 83		1,024,12
June			3 25		3 25					3 25
July	245 07		27 28	28 50	300 85		5 40			306 25
August			9 75		9 75					9 75
September		244 86	2 25		247 11					247 11
October	8 00	84 66	10 00		102 66	3 20				105 86
November		24 50	14 75	51 64	90 89					90 89
December	17 48		2 00	13 50	32 98					32 98
1915										
January		561 01	13 50	91 54	666 05					666 05
February			2 75		2 75					2 75
March	49 90		1 25		51 15	3 20			5 00	59 35
Totals	969 25	915 03	120 16	223 18	2,227 62	6 40	5 40	358 83	5 00	2,603 25
Collected at Head Office.										
1914.										
April										
May	427 50				427 50					427 50
June										
July										
August										
September										
October	98 17				98 17					98 17
November										
December										

1915.										
January										
February										
March										
Totals	525 67				525 67					525 67
Grand Totals	1,494 92	915 03	120 16	223 18	2,753 29	6 40	5 40	358 83	5 00	3,128 92

Certified correct.

T. J. WADMAN,
Crown Timber Agent.

SCHEDULE B.—Showing the Mills (including the Portable Mills) operating within the Revelstoke Agency, under Government Permits, for the Fiscal Year ending March 31, 1915.

No.	Mill Owner.	Location of Mill.	Berth No.	Kind of Power.	Horse Power.	Capacity per 10 hours.	Species of Timber cut.	Lumber. Manufactured.	Logs Cut.	Average per Log	Ry. Ties. Manufactured.	Ry. Ties. Sold.	....	Date of Last Return.	Remarks.
										Ft. B.M.					
1	Columbia Riv. Lbr. Co.	Golden, B.C.	15	Electric	1,200	200 M	Spruce & fir	6,067,205	44,788	135·4			4	Mar. 31, '15	
			16										4	" "	12 cords wood.
2	Forest Mills of B.C.	Comaplix	112	Steam	500	100 M	Cedar	45,763	300	152·5			4	" "	
			127										4	" "	808 teleph. poles
			279										4	" "	932 "
			116	Steam	200	50 M	Spruce & fir				3,370	3,370	4	" "	13,508 fence posts 1 telephone pole.
3	G. B. Ferguson & Co., Ltd.	Six Mile Creek near Beaver						6,112,968							

Certified correct.

T. J. WADMAN,
Crown Timber Agent.

SCHEDULE D.—General Office Return of the Crown Timber Agency, Revelstoke, for Fiscal Year ending March 31, 1915.

Particulars.	Number, etc.	As compared with previous year increase.	As compared with previous year decrease.	Remarks.
Letters received		Agency opened on April 1, 1914, therefore no comparisons can be made.		Included with Land Office returns.
Letters written				Included with Land Office returns.
Permits subject to dues issued	10			
Free permits issued	72			
Seizures made	10			
Mill returns received and verified	325			
Mills operating under government license	3			
Mills operating under government permits	None.			
Quantity of lumber manufactured, under license	6,112,968 Ft. B.M.			
Quantity of lumber sold, under license				
Quantity of lumber on hand, under license				
Hay permits issued	2			
Average price at which lumber is sold	$15.35			

No. 30i.

CALGARY, April 9, 1915.

SIR,—I beg to respectfully submit herewith the report of this department for the period from April 1, 1914, to March 31, 1915, during which time I have made 5,168 inspections, travelling 15,775 miles, of which 7,962 was by trail and 7,813 miles by rail. In general, I visited and inspected every district in the province with the exception of that portion north of the Peace river.

Speaking in general terms, I have found that the live stock industry has improved throughout the province, and that stockmen are gradually working out of the old habits of allowing mature stock to rustle all winter, and are in most cases putting up sufficient feed to at least ensure their stock should severe winter weather make feeding a necessity. This is generally true with the larger owner, the small rancher and stockman usually feeding throughout two or three months whether the range is snowed under or not. The result is being shown in better-conditioned cattle and less extensive ranges.

I find that some districts suffered more from drought than others, but that the loss has not been excessive. The mild winter and early spring, unaccompanied by any heavy or driving storms, is responsible to some extent for this fortunate condition while another cause is that more stockmen keep their range stock well in hand and are at least prepared to feed when the necessity arises.

With regard to particularizing my inspection trips, I beg to state that I have inspected the country west of Edmonton for a distance of 197 miles, have gone over

the district northwest of Edmonton in the general direction of the route of the Edmonton, Dunvegan and British Columbia Railway line well beyond the Athabaska river, and have also inspected northeast of Edmonton through the country in which the Alberta and Great Waterways railway is building, travelling nearly to lac la Biche. In addition to these north country inspections, I covered the province along the east boundary from north of the Canadian Northern main line to the international boundary, taking also a short trip into southwestern Saskatchewan. I have also been over the range country in the south the edge of the forest reserve from the American boundary to the Saskatchewan river.

On my inspection west of Edmonton I found that the country was good summer range, considerably cut up with muskegs but well grassed and well watered. This district is poorly settled, and there are comparatively few cattle. Many entire townships have not one settler in them. There is a quantity of brush and considerable open country, but the winter range would not be advisable on account of deep snows and the infrequency of warm winter winds which are more dependable farther south.

Northwest from Edmonton the country is fairly well-settled for some distance and is bluffy and open in some parts. Farther north great tracts are covered with brush, and the rivers are timbered quite heavily. Sandy, wooded ridges interspersed with well-watered flats are frequent brush being encountered in greater or less extent everywhere. Good streams water the country in spring and early summer, some of the smaller ones almost drying up by fall if the summer rainfall is not up to average. The country, taken as a whole, is good summer range.

Northeast from Edmonton toward lac la Biche there are few settlers. These are having difficulties, not particularly with their stock or range, but with the brush, which is very dense. A considerable portion of this country would require an expenditure of $50 an acre to clear properly. There is good summer range for such stock as is in the district, though the flies are sometimes bad. This fly pest is felt to some extent northwest of Edmonton as well.

Farther south and in the central eastern portion of the province there is a big territory around Sounding lake and the Neutral hills where the soil is sandy and rocky. The country is also quite hilly. It is more suitable for range than for farming, the range being well adapted to sheep or horses especially.

Across the entire southern portion of the province in that district which has been generally designated as the range district proper, the conditions were found to be satisfactory in spite of certain dry localities. The drought was worst south and a little east of Medicine Hat, but, thanks to winter feeding, there was no excessive loss, though the percentage has been slightly heavier than in other southern districts.

Along the forest reserve from the American boundary to the Saskatchewan river there are frequent broad, open flats which make good summer range and in some cases are ranged the year round, especially by horsemen. The fly nuisance is felt in some of these foot-hill sections. Winter range along the Big Red Deer almost to the headwaters in the mountains, while the other rivers west of the Calgary and Edmonton railway and south of the Saskatchewan river are well supplied with broad benches of open ground, the grass in most cases being the natural upland growth which cures on the root almost as well as the proper bunch grass of the southern and more open prairies. These grasses, the natural prairie hay, never grow again after having been once ploughed under and broken up. As an illustration: one patch of 20 acres of prairie upland hay ground ploughed up thirty odd years ago and left idle since then has never grown back to the native state. It shows a good growth every summer, but when frost comes the vegetation simply dies down and loses every particle of nutrition.

The foot-hill country north of the Canadian Pacific Railway's main line is frequently too bushy or too much timbered to be anything but a summer range, though the open river bottoms with their timber bluffs and pea-vine ridges make reasonably

safe rustling for small bands. Yet stockmen in this district should put up feed sufficient for two months at least. The edge of the Chinook winds can be depended on in this section almost to the Rocky Mountain House at the junction of the Clearwater and Saskatchewan rivers.

What little loss there has been from disease among the range stock of the province has been chiefly due to infected animals which have been brought in from outside points.

The new regulations which have been recently put into force have met with approval from farmers and stockmen alike.

During the past year I was six days off duty and spent 72½ days at headquarters. Twenty-eight Sundays of the year were spent in departmental work, travelling or inspecting. Appended please find detailed account of expenditure, inspections and mileage.

The following is the fiscal statement from April, 1914, to March, 1915:—

Month.	Expense.	Insp.	Miles W.	Rail.	Days O. D.	Days Hq.
1914.	$ cts.					
April	277 35	338	1,258	490	0	11
May	189 65	304	811	362	0	5
June	145 70	390	450	289	0	3
July	84 70	56	197	390	5	8
August	303 45	536	1,017	306	0	0
September	239 85	258	840	682	0	5½
October	229 20	405	328	1,426	0	4
November	338 15	480	960	390	0	0
December	226 10	2,010	836	529	0	5
1915.						
January	231 15	116	441	1,374	1	5
February	215 50	230	563	1,294	0	7
March	74 00	57	261	290	0	19
	2,554 80	5,180	7,962	7,813	6	72¼

Contingent Cheque No.	8425	400 00
" "	8709	200 00
" "	8841	400 00
" "	8940	200 00
" "	4092	200 00
" "	4143	200 00
" "	194	250 00
" "	45	400 00
" "	457	300 00
		$2,550 00

Expenses for year..... $2,554 80

Amt. due from Department..... 4 80 Bal.

In regard to days off duty, I wish to say that I have worked about twenty-eight Sundays during the past year.

During this time there has been approximately 1,800 callers at the office for information; also about 600 letters and copies of regulations were sent out.

Your obedient servant,

GEO. H. CLOAKLY,

Inspector of Ranches.

No. 30j.

MAPLE CREEK, SASK., April 16, 1915.

The Controller,
Timber and Grazing Lands Branch,
Department of Interior,
Ottawa, Ontario.

SIR,—I beg to submit herewith a report of my office for the year ending March 31, 1915. During the year I made as follows: Inspections on 2,871 quarter-sections; drove by team, 4,704 miles; travelled, 5,713 miles by rail.

Conditions here were good during the past summer, except in a few cases where there was a shortage of water. Owing to the drought which caused a total failure in the southwestern part of Saskatchewan, fodder was very scarce, and stockmen had difficulty securing sufficient to winter their stock.

More feeding was necessary during the past winter than usual owing to the deep snow which made range feeding nearly impossible, but losses were comparatively light. Stockmen are making more preparations for winter feeding than in the past and trusting less to stock ranging for themselves.

Your obedient servant,

RUSSELL SEXSMITH,
Inspector of Ranches.

Summary of work performed for the year ending March 31, 1915:—

Date.	No. Offices Inspected	Miles travelled.		Days at Hdqts.	Days off Duty.	Worked Sun.
		By Rail.	By Wagon.			
April	621	479	472	12	3	2
May	367	691	565	9	2	4
June	741	506	651	9	2	2
July	365	264	563	10	5	2
August	232	299	487	13	3	1
September	184	76	603	7	1	3
October	130	1,331	355	10	3	1
November	79	632	477	6	0	.....
December	73	550	264	20	0	2
January	79	399	267	17	1	2
February	.....	.....	.....	28	16	1
March	.....	486	.....	29	5	.....
	2,871	5,713	4,704	170	41	20

No. 30k.

MINNEDOSA, MAN., April 23, 1915.

SIR,—I beg to tender you my annual report covering the transactions of my office for the fiscal year ending March 31, 1915.

As this office has been doing the business for the ranching districts of Dauphin and Prince Albert since they have been opened by the department in March, 1914, the volume of the business has greatly increased up to the present time, until it has become impossible for one inspector to keep up with the work, both districts being very large. The Dauphin district expands from the southern boundary of township 35 north, and from the Ontario boundary east to range 11, west 2nd meridian, being 204 by 342 miles square. Prince Albert being much larger, running from the Ontario boundary on the east to the Alberta boundary on the west, and all north of township 34.

In the last year there has been in the Dauphin district, 117 applications for grazing leases, varying in size from 40 to 12,000 acres, eighty-nine of these have been inspected and reported, leaving a balance of twenty-eight outstanding inspections.

In the Prince Albert district there have been 222 applications for leases of various sizes, ninety-seven inspections made and reported on, leaving a balance of 125 outstanding inspections.

This work necessitated the travelling by rail of 12,952 miles, and 3,235 miles by various other means of conveyance, such as wagon, horseback, steamboat and canoe, in all, 1,007 quarter- or fractional quarter-sections have been inspected, totalling 160,720 acres.

As instructed by the department in February, I moved my headquarters from the town of Dauphin to Minnedosa, which I find will greatly assist me in my work, there being better railroad connections from the latter town to the south and east.

From February 27 to April 20 I was assisting the Immigration Department in the distribution of seed grain, being instructed to do so by Chief Inspector of Dominion Lands Agencies, H. G. Cuttle. This accounts for why I am in arrears with my inspection work, as the roads and weather were very suitable at the period of my absence for inspection work.

I am, sir,

Your obedient servant,

H. L. BOURJET,

Inspector of Ranches.

No. 301.

Moosejaw, Sask., April 1, 1915.

B. L. Yorke, Esq.,
Controller T. and G. Lands Branch,
Department of the Interior,
Ottawa, Ont.

Sir,—I have the honour to report the work done from this office during the year ending March 31, as follows:—

No. of inspections reported on	226
No. of quarter-sections covered by reports	1,050
No. of quarter-sections recommended for lease	726

Since I took charge of this office on August 11 last, I have travelled:—

By rail	5,270
Driven	2,746

Your obedient servant,
G. H. LYDEARD,
Inspector of Ranches.

No. 31.

REPORT OF THE SUPERINTENDING ACCOUNTANT.

Department of the Interior,
Accounts Branch,
Ottawa, May 28, 1915.

W. W. Cory, Esq., C.M.G.,
Deputy Minister of the Interior,
Ottawa, Ontario.

Sir,—I have the honour to submit herewith statements of revenue collected from various sources during the fiscal year ended March 31, 1915, as follows:—

A.—Dominion lands, including Yukon	$3,177,386 73
B.—Ordnance lands	4,416 64
C.—School lands	943,717 00
D.—Registration fees, Yukon	969 85
E.—Fines and forfeitures, N.W.T.	62 00
F.—Casual revenue	11,816 13
G.—Seed grain and relief repayments	68,503 56
H.—Fines under Immigration Act	5,766 00
I.—Chinese immigration revenue	588,124 00
J.—Sales of land, special account	539,711 15
	5,340,473 06

A statement of revenue on account of Dominion Lands (marked K) shows the receipts monthly, classified under subheads.

Statement (marked L) shows a comparison between the receipts on account of revenue of the previous twelve months.

Your obedient servant,
CHAS H. BEDDOE.
Superintending Accountant.

SESSIONAL PAPER No. 25

A.—Dominion Lands Revenue (Cash and Scrip) for the Fiscal Year ended March 31, 1915.

Agencies.	Cash.	Scrip.	Total.
	$ cts.	$ cts.	$ cts.
Yukon Territory—			
Sales of land	2,530 79		2,530 79
Rentals of land	6,971 99		6,971 99
Map sales, office fees, etc	146 75		146 75
Timber dues	11,802 12		11,802 12
Hay permits	42 00		42 00
Mining fees	61 242 81		61,242 81
Export tax on gold	116,241 04		116,241 04
Free certificates for export of gold	107 00		107 00
Hydraulic leases	5,286 98		5,286 98
Homestead fees	90 00		90 00
Rent of water-power	250 00		250 00
Interim receipt account	1,015 37		1,015 37
Dredging leases	5,397 49		5,397 49
	211,124 34		211,124 34
Dominion Lands Agencies—			
Battleford	46,180 59		46,180 59
Brandon	3,305 62		3,305 62
Calgary	122,986 67		122,986 67
Dauphin	18,171 72		18,171 72
Edmonton	101,078 89		101,078 89
Estevan	2,111 55		2,111 55
Grand Prairie	15,178 47		15,178 47
Grouard	16,996 08		16,996 08
Humboldt	12,760 81		12,760 81
Kamloops	10,672 51		10,672 51
Lethbridge	46,918 54		46,918 54
Maple Creek	74,752 29	80 00	74,832 29
Medicine Hat	51,980 57		51,980 57
Moosejaw	125,561 86		125,561 86
New Westminster	9,670 69		9,670 69
Prince Albert	24,369 24		24,369 24
Red Deer	45,401 55		45,401 55
Regina	6,036 91		6,036 91
Revelstoke	3,979 33		3,979 33
Saskatoon	107,925 46		107,925 46
Swift Current	93,565 73		93,565 73
Weyburn	60,326 32		60,326 32
Winnipeg	54,855 36		54,855 36
Yorkton	11,402 54		11,402 54
	1,066,189 30	80 00	1,066,269 30
Crown Timber Agencies—			
Battleford	894 31		894 31
Brandon	212 40		212 40
Calgary	25,631 56		25,631 56
Dauphin	10,340 79		10,340 79
Edmonton	55,894 30		55,894 30
Estevan	153 00		153 00
Grand Prairie	529 39		529 39
Grouard	779 32		779 32
Humboldt	579 81		579 81
Kamloops	12,655 96		12,655 96
Lethbridge	1,289 36		1,289 36
Maple Creek	512 05		512 05
Medicine Hat	397 06		397 06
Moosejaw	86 25		86 25
New Westminster	73,928 44		73,928 44
Prince Albert	52,828 99		52,828 99
Red Deer	1,345 43		1,345 43
Regina	206 05		206 05
Revelstoke	2,758 29		2,758 29

A.—Dominion Lands Revenue (Cash and Scrip) for the Fiscal Year ended March 31, 1915.—*Concluded.*

Agencies.	Cash.	Scrip.	Total.
	$ cts.	$ cts.	$ cts.
Saskatoon	158 75	.....	158 75
Swift Current	56 00	.....	56 00
Weyburn	3 00	.....	3 00
Winnipeg	57,183 57	.....	57,183 57
Yorkton	708 09	.....	708 09
	299,132 17	.....	299,132 17
Miscellaneous—			
Rocky Mountains Park	35,380 21	.....	35,380 21
Jasper Park	1,221 65	.....	1,221 65
Yoho Park	656 25	.....	656 25
Waterton Lakes Park	257 46	.....	257 46
Elk Island Park	5 00	.....	5 00
Buffalo Park	22 69	.....	22 69
Glacier Park	345 71	.....	345 71
Revelstoke Park	7 00	.....	7 00
Survey fees	9,607 92	.....	9,607 92
Irrigation fees	679 50	.....	679 50
Irrigation sales	5,549 67	.....	5,549 67
Map sales, office fees, etc	10,568 83	.....	10,568 83
Fees, Board of Examiners, D.L.S	970 60	.....	970 60
Mining fees	16,100 31	.....	16,100 31
Grazing lands	101,710 58	400 00	102,110 58
Hay permits	9,023 62	.....	9,023 62
Coal lands	247,466 59	.....	247,466 59
Dredging leases, N.W.T	200 00	.....	200 00
Stone quarries	12,098 40	.....	12,098 40
Rent of water-power	703 98	.....	703 98
Suspense account	7,663 62	.....	7,663 62
Sales of land	13,363 61	.....	13,363 61
Rentals of land	986 26	.....	986 26
Petroleum	1,116,181 89	.....	1,116,181 89
Sand, stone, and gravel	2,517 58	.....	2,517 58
Forestry branch, sale of trees, etc	1,366 23	.....	1,366 23
Miscellaneous	6,265 76	.....	6,265 76
Homestead fees	20 00	.....	20 00
	1,600,940 92	400 00	1,601,340 92
	3,177,386 73	480 00	3,177,866 73
Less—Refunds	317,672 14	92 61	317,764 75
	2,859,714 59	387 39	2,860,101 98

GEO. D. POPE,
Controller of Revenue.

B.—Statement of Ordnance Lands Revenue for the Fiscal Year ended March 31, 1915.

1914.

April	$ 161 30
May	1,499 47
June	1 75
July	1,072 30
August	48 83
September	58 22
October	417 50
November	74 24
December	255 00

1915.

January	421 10
February	234 63
March	172 30
	$4,416 64
Less refunds	7 00
	$4,409 64

GEO. D. POPE,
Controller of Revenue.

C.—Statement of Receipts on Account of School Lands for the Fiscal Year ended March 31, 1915.

Month.	Manitoba School Lands.	Saskatchewan School Lands.	Alberta School Lands.	Total.
1914.	$ cts.	$ cts.	$ cts.	$ cts.
April	6,981 07	19,524 63	12,722 14	39,227 84
May	7,540 16	22,816 66	29,052 12	59,408 94
June	26,732 46	97,150 17	85,845 70	209,728 33
July	19,770 22	43,154 62	62,318 47	125,243 31
August	4,669 54	3,967 44	18,277 09	26,914 07
September	6,367 00	8,806 27	8,473 09	23,646 36
October	20,230 83	28,009 56	34,006 17	82,246 56
November	59,869 39	61,705 15	47,176 87	168,751 41
December	34,326 53	36,366 26	18,090 01	88,782 80
1915.				
January	5,961 00	22,328 11	13,735 78	42,024 89
February	3,380 11	16,439 51	11,039 94	30,859 56
March	12,778 91	18,330 45	15,773 57	46,882 93
	208,607 22	378,598 83	356,510 95	943,717 00

GEO. D. POPE,
Controller of Revenue.

D.—Statement of Registration Fees in the Yukon Territory, for the Fiscal Year ended March 31, 1915.

Month.	Registrar.	Amount.
1914.		$ cts.
April	A. E. Lamb	61 75
May	"	105 00
June	"	75 00
July	"	68 50
August	"	91 50
September	"	169 95
October	"	118 75
November	"	91 75
December	"	41 00
1915.		
January	"	47 80
February	"	34 35
March	"	64 50
		969 85

GEO. D. POPE,
Controller of Revenue.

E.—Statement of Fines and Forfeitures in the Northwest Territories for the Fiscal Year ended March 31, 1915.

Month.	From Whom Received.	Amount.
1914.		$ cts.
September	C. W. Wilson, J.P.	10 00
November	R. Field, J.P.	52 00
		62 00

GEO. D. POPE,
Controller of Revenue.

F.—STATEMENT of Casual Revenue for the Fiscal Year ended March 31, 1915.

Name.	Particulars.	Amount.
		$ cts.
F. W. Pettinger	Salary for September, 1911, not used—Dominion Lands and Parks—Parks	25 00
Inspector F. J. Biggs	Proceeds sale of horse—Dominion Lands and Parks—Contingencies	96 00
T. A. Burrows	Refund cost of installing telephone—Dominion Lands and Parks—Forestry	7 90
Canadian Pacific Ry. Co	Refund, unused portion of ticket, Vancouver to Ottawa of Miss A. Poff—Immigration Expenses	56 05
A.D.L., Grouard	Sale of old office furniture—Dominion Lands and Parks—Contingencies	3 50
A.D.L., Swift Current	Proceeds sale of old buggy—Dominion Lands and Parks—Contingencies	20 00
Inspector J. F. McKenzie	Proceeds sale of horse—Dominion Lands and Parks—Contingencies	60 00
M. C. Hendry	Proceeds sale of Bow River outfit—Water-power Investigations—Dominion Lands and Parks	524 35
J. D. Craig	Refund on account error in pay-list 141st meridian survey, 1912, A. E. Patterson's salary—Scientific Institutions, Astronomical Surveys	450 00
Inspector Jones	Sale of horse formerly used by him—Dominion Lands and Parks—Contingencies	50 00
C. W. Wellman	Proceeds sale of pony—Dominion Lands and Parks—Forestry	54 60
Controller of Yukon	Refund from Third Ave. livery stable, being a duplicate payment—Expenses of Government—Yukon Territory	15 00
Ottawa Blue Print Co	Refund of overpayment—Dominion Lands and Parks—Surveys	1 00
F. D. Brown	Refund balance on hand, March 31, 1914	3 40
Imperial Oil Co	Refund of duplicate payment—Dominion Lands and Parks—Forestry	104 00
Fred C. Swaite	Refund of expenses incurred by department—Relief of distressed Canadians	1 00
D. H. Nelles	Refund amount overpaid to Thos. Grace in 1913—Scientific Institution—Astronomical Surveys	9 73
Inspector F. M. McKenzie	Proceeds sale of democrat—Dominion Lands and Parks—Contingencies	15 00
S. J. Robins	Refund balance on hand, March 31, 1914—Dominion Lands and Parks—Water-power Investigations	36 95
J. P. McDougall	Salary for January not used	8 75
H. Bowes	Salary for January not used—Dominion Lands and Parks—O. S. Salaries	65 00
Jos. Patterson	Proceeds sale of three old carts—Dominion Lands and Parks—Surveys	5 00
Title and Trust Co	Refund for late C. E. Johnson of amount on band	534 00
G. F. McKenzie	Refund balance on hand, acct. advance for expenses—Expenses of Government—Yukon Territory	68 90
Phelan & Shirley	Refund of amount caused through error in addition of their account for fire fighting in March, 1913—Dominion Lands and Parks—Parks	11 38
F. C. Swaite	Refund account expenses for repatriation—Relief of distressed Canadians	1 00
Albert Roth	Refund account expenses repatriation—Relief of distressed Camadians	20 00
W. H. Hay	Refund balance account advance for expenses—Immigration Expenses	41 65
J. P. Jaffray	Balance on hand March 31, 1914—Immigration Expenses	9 21
Chisholm & McCurdy, Receiver General	Balance on hand of Homestead Inspector Moubert—Dominion Lands and Parks—Contingencies	0 75
John Black	Overpayment made to him March 31, 1914—Expenses of Government—Yukon Territory	9 42
C. D. Brown	One steel tape charged twice to his account—Dominion Lands and Parks—Surveys	13 50
Inspector Sutherland	Proceeds sale of horse—Dominion Lands and Parks—Contingencies	47 48
G. Niven	Winnipeg Immig. Chk. 2966 of Jan. 12, 1914, for services, not used—Immigration Expenses	2 25

F.—STATEMENT of Casual Revenue for the Fiscal Year ended March 31, 1915.—*Continued.*

Name.	Particulars.	Amount.
		$ cts.
J. S. Plaskett	Refund account expenses 1913-14—Scientific Institutions—Astronomical Surveys	336 80
J. D. Kirkwood	Overpayment expense account, Sept., 1913—Dominion Lands and Parks—Forestry	1 00
Albert Roth	Refund expenses incurred *re* repatriation of family from Mexico—Relief of distressed Canadians	20 00
J. S. Plaskett	Refund unexpended balance of advance for expenses—Scientific Institutions—Astronomical Surveys	400 95
M. H Boulais	Overpayment for surveying Discovery Claim on Five-mile creek, Sixty-mile district—Dominion Lands and Parks—Surveys	50 00
Mrs. C. Goodfellow	Unclaimed Chk. No. 3432 of Sept. 12, 1911, not used Immigration Expenses	10 00
The Topley Co	Refund of overpayment during 1913-14—Dominion Lands and Parks—Parks	160 45
Late H. G. Herbert	Unexpended balance of advance made to him—Immigration Expenses	35 79
H. A. Sharpe	Refunded unexpended balance of advance for expenses—Immigration Expenses	17 00
Albert Roth	Refund account repatriation expenses of family from Mexico—Relief of distressed Canadians	20 00
W. J. Quigley	Chk. No. 302, Feb. 26, 1914, not used—Dominion Lands and Parks—Contingencies	8 80
Inspector DeBalinhard	Proceeds sale of old team—Dominion Lands and Parks—Contingencies	90 00
W. McLellan	Salary from March 23 to 31, 1914, not used—Dominion Lands and Parks—O.S. Salaries	31 11
H. A. Sharpe	Refund account expenses 1913-14—Immigration Expenses	17 00
Ocean Accident and Guarantee Corporation, Ltd	Balance unexpended, 1913-14—Dominion Lands and Parks—Contingencies	4 85
Inspector J. S. McLellan	Sale of old team—Dominion Lands and Parks—Contingencies	125 00
J. B. Harkin	Balance on hand March 31, 1914—Dominion Lands and Parks—Parks	98 80
Controller Yukon Territory	Balance unclaimed estates in the Yukon as follows:— James Kelly $ 271 00; John Grant 691 90; Mike Covac 2,802 50	3,765 40
Canadian Oil Co., Ltd	Refund on barrels which were returned to them—Dominion Lands and Parks—Parks	66 60
R. C. Miller	Amount received from L. B. Davis for purchase by him of an old safe—Expenses of Goverament—Yukon Territory	100 00
Albert Roth	On account expenses *re* repatriation of family from Mexico—Relief of distressed Canadians	20 00
Canadian Pacific Ry. Co	F. Bott's salary Nov. 18, 1913, to March 31, 1914—Dominion Lands and Parks—Parks	443 33
Inspector Balfour	Proceeds sale of old horses—Dominion Lands and Parks—Contingencies	57 95
Western Jobbers' Clearing House	Amount collected from McKay & Laing for supplies left in their store—Dominion Lands and Parks—Forestry	10 17
Receiver General	Transfer from Dominion Lands Revenue of amount paid by E. E. Johnson of duplicate payment for hardware supplied April 21, 1913, to Parks Branch—Dominion Lands and Parks—Parks	8 35
J. B. Challies	Refund on account expenses 1913-14—Dominion Lands and Parks—Water-power Investigations	17 02
Mrs. M. G. Niblett	Refund account expenses—Immigration Expenses	100 00
Controller of Yukon	Amount collected from estate of Chas. Willis, insane patient, New Westminster asylum—Expenses of Government—Yukon Territory	405 68
Commissioner Immigration, Winnipeg	Proceeds of sale of blankets as per statement—Immigration Expenses	87 15
Thos. Briggs		4 50

F.—STATEMENT of Casual Revenue for the Fiscal Year ended March 31, 1915.—*Continued.*

Name.	Particulars.	Amount.
		$ cts.
W. Headman	Sale of old blankets, Port Arthur, Immigration Hall—Immigration Expenses	4 50
A. Snape	For 13 pairs old blankets, Immigration Hall, Vermilion—Immigration Expenses	13 00
Commissioner Immigration	Sale of blankets—Immigration Expenses	63 25
G. P. Mackenzie	Refund account travelling expenses, 1913-14—Yukon Territory	239 15
H. A. Sharpe	Refund account expenses, 1913-14—Immigration Expenses	17 00
Albert Roth	Account repatriation expenses of family—Relief of distressed Canadians	20 00
Receiver General	Amount of vouchers Nos. 35 and 98, March Account, Commissioner of Irrigation—Irrigation Surveys	2 2
A. McLean	Balance on had 1912-13—Dominion Lands and Parks Forestry	49
H. A. Sharpe	Refund account expenses 1913-14—Immigration Expenses	17 00
W. J. Boyd	Proceeds sale of canoe—Dominion Lands and Parks—Forestry	35 00
C. W. Wellman	Proceeds sale of two yoke of oxen, and harness—Dominion Lands and Parks—Forestry	225 40
H. F. J. Lambart	Proceeds sale of horses—Astronomical Surveys	250 00
Commissioner Immigration	Proceeds sale of old stove and spring bed at Edmonton—Immigration Expenses	2 70
C. C. Bailey	Proceeds sale of old house on Cooking Lake forest reserve—Dominion Lands and Parks—Forestry	10 00
F. A. McDiarmid	Refund balance on land account 1913-14—Scientific Institutions—Astronomical Surveys	98 99
F. H. Kitto	Proceeds sale of provisions left over from supplies—Dominion Lands and Parks—Surveys	15 00
Albert Roth	Refund account expenses repatriation of family from Mexico—Relief of distressed Canadians	20 00
H. A. Sharpe	Refund account expenses 1913-14—Immigration Expenses	17 00
J. Krynen	For old stove and old spring bed at Edmonton, Immigration Hall—Immigration Expenses	5 00
H. H. Crawford	For thirty-seven pairs old blankets at Stratheona Immigration Agency—Immigration Expenses	40 00
John Swanson	Refund on account of expenses incurred by Department for repatriation of Miss Alice Poff from Tientsin to Vancouver—Immigration Expenses	50 00
Inspector Fraser	Proceeds sale of horse—Dominion Lands and Parks—Contingencies	42 75
T. H. E. Magee	Refund account advance for expenses 1913-14—Dominion Lands and Parks—Contingencies	22 58
J. D. McArthur	Refund amount overpaid H. P. Moulton for salary in 1913-14—Scientific Institutions—Astronomical Surveys	7 66
A. D. Lds., Humboldt	Proceeds sale of old stove—Dominion Lands and Parks—Contingencies	37 00
H. A. Sharpe	Refund account expenses 1913-14—Immigration Expenses	17 00
Albert Roth	Refund account repatriation expenses of his family from Mexico—Relief of distressed Canadians	20 00
C. Wolff	Refund amount overpaid him for provisions in June, 1913—Immigration Expenses	10 00
W. V. Bennett	Refund overpayment made to Omaha Express Co. in 1913—Immigration Expenses	2 74
High Commissioners Office, London England	re "Icelandic Fares"—Immigration Expenses	56 94
Controller of Yukon Territory	Sale of old Remington typewriter—Expenses of Government—Yukon Territory	20 00
G. T. Ry. System	Refund freight charges on Immig. literature, November 1913—Immigration Expenses	15 63
G. T. Ry. System	Cancellation of freight charges in Canada from Ottawa and various places, October, 1913—Immigration Expenses	33 65

F.—STATEMENT of Casual Revenue for the Fiscal Year ended March 31, 1915.—*Continued.*

Name.	Particulars.	Amount.
		$ cts.
Elizear Ginsgras	$5.21 overpaid to Providence Tel. Co. in Jan., 1914, and $2.50 supposed to have been paid to J. B. Charbonneau in September, 1913—Immigration Expenses	7 71
H. A. Sharpe	Refund account expenses 1913-14—Immigration Expenses	17 00
John Riggs	Refund overpayment telephone account July 1913—Immigration Expenses	70
J. F. Joffray	Refund overpayment salary for Sept., 1913—Immigration Expenses	16 67
John Hoolahan	Refund double payment for storage of baggage of Daisy Heath—Immigration Expenses	50
W. J. White	Refund double charges for meals and room for Mr. Wenikauff in Aug. and Nov., 1913—Immigration Expenses	5 80
E. W. Clarke	Refund amount overpaid for the 1st and 2nd of August, 1913—Civil Government—Contingencies	2 69
D. W. Johnson	Refund balance on hand on account expenses—Dominion Lands and Parks—Parks	80 25
A. D. Lds., Humboldt	Balance on hand March 31, 1914—Dominion Lands and Parks—Contingencies	81
A. D. Lds., Prince Albert	Refund proceeds sale of old harness—Dominion Lands and Parks—Contingencies	5 00
Albert Roth	Refund on account expenses repatriation of his family from Mexico in 1913—Immigration Expenses	20 00
Receiver General	Amount paid J. W. Forbes by Herman Krebs for provisions supplied in 1914	40 00
H. A. Sharpe	Refund on account of expenses 1913-14	17 00
G. T. Ry. Co	Refund overcharge on freight March 22 to December 1, 1913—Immigration Expenses	70 34
G. T. Ry. Co	Refund overpayment freight charges Jan. 8 to Sept. 15, 1913; Dec. 31, 1913, to January 30, 1914—Immigration Expenses	86 73
Albert Roth	Refund account expenses repatriation of his family from Mexico in 1913—Immigration Expenses	20 00
P. R. A. Belanger	Debit balance in his 1913 account—Dominion Lands and Parks—Surveys	233 10
John Russell	Cheque No. 3213 issued March 31, 1912, not used—Immigration Expenses	4 25
A. Roth	On account of repatriation of his family from Mexico—Immigration Expenses	20 00
O. J. Klotz	Refund account of travelling expenses—Astronomical Surveys	29 20
J. B. Harkin	Refund account of travelling expenses—Dominion Lands and Parks	164 40
N. M. Ross	Refund account of duty on labels—Dominion Lands and Parks—Protection of Timber	1 25
Homestead Inspector Ripley	Refund account of proceeds sale of old team—Dominion Lands and Parks—Contingencies	145 00
Homestend Inspector Smythe	Refund account of proceeds sale of old harness—Dominion Lands and Parks—Contingencies	5 00
C. C. Reed	Refund account of postage and commission—Dominion Lands and Parks—Contingencies	1 98
Timber Inspector Jno. McKinley	Refund account of proceeds of sale of horse $50, and harness $11.15—Dominion Lands and Parks—Contingencies	61 15
H. F. J. Lambart	Refund account of J. D. Craig's Survey of 1913-14—Scientific Institutions—Astronomical Surveys	27 00
Wm. Truscott	Refund account of expenses—Immigration — Contingencies	97
Bank of Montreal, London	Refund—Mrs. Niblit—Immigration Expenses	78 03
		$ 11,488 53
	Less refunds	1,065 69
		$10,422 54

F.—STATEMENT of Casual Revenue for the Fiscal Year ended March 31, 1915.—*Concluded.*

Name.	Particulars.	Amount.
		$ cts.
G. W. Burrell	Fees for liquor permits	2 00
W. Keddy	Fees for liquor permits	2 00
Nor' Trading Co	Fees for liquor permits issued to employees of Nor' Trading Co	67 00
Hudson's Bay Company	Fees for liquor permits issued to employees of said company in the Mackenzie River district	68 50
N. H. Bacon, Fur Trade Com'r., Hudson's Bay Co	Fees for liquor permits	29 00
Hudson's Bay Co	Liquor permit fees issued to employees of said company in McKenzie River district	15 50
Lewis Conibear	Fee for liquor permit No. 1041 issued to him	3 35
Rev. Father Lefebvre	Fee for liquor permit issued to him	5 50
Fairweathers', Ltd	Fees for liquor permits issued to employees of said company at Fort Resolution	31 00
Hudson's Bay Co	Liquor permit fees issued to employees of said company in the McKenzie River district	13 00
Chas. T. Christie	Fee paid on permit for 2 gal. brandy and 2 gal. whisky	4 00
Hudson's Bay Co	Liquor permit fees	32 00
Chas. F. Law	Liquor permit No. 1119 for 5 gal. liquor	5 00
Julian Passepartout	Liquor permit No. 1122 for 3 gal. whiskey	3 00
Harold Oldham	Fee for liquor permit	2 00
Jas. Baird Smith	Fee for liquor permit	2 00
Hudson's Bay Co	Timber dues	42 75
		$ 327 60
	Less refunds	1,065 69
	Net total	10,750 44

GEO. D. POPE,

Controller of Revenue.

G.—STATEMENT showing Repayments on Account of Seed Grain Advances

——	Seed Grain Advances 1915.	Seed Grain Advances 1914.	Seed Grain Advances 1913.	Seed Grain Advances 1912.	Seed Grain Advances 1911.	Seed Grain Advances 1909.	Seed Grain Advances 1908.	Seed Grain Advances 1901.
	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
	3,419 85	1,290 27	1,702 29	28,574 07	18,231 40	833 70	6,488 39	253 95
Refunds.....	.....	1 05	2 70	119 33	339 68	.....	389 59	73 75
	3,419 85	1,289 22	1,699 59	28,454 74	17,891 72	833 70	6,098 80	180 20

and Relief Mortgages for the Fiscal Year ending March 31, 1915.

—	Seed Grain Advances 1896.	Seed Grain Advances 1895.	Seed Grain Advances 1894.	Seed Grain to Settlers Account 1890.	Territor'l Account. 1886-7-8.	Relief Mrtgs. 1876.	Relief Advances	Total.
	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
	190 78	570 43	360 39	356 70	618 74	711 83	4,900 77	68,503 56
Refunds.....	.....	.....	.....	.....	.....	68	80 89	1,007 67
	190 78	570 43	360 39	356 70	618 74	711 15	4,819 88	67,495 89

GEO. D. POPE,

Controller of Revenue.

H.—Statement of Fines under Immigration Act for the Fiscal Year ended March 31, 1915.

Month.	From Whom Received.	Amount.
1914.		$ cts.
April	John O. Hunt	70 00
"	C. St. Geo. Yarwood	30 00
"	Police Magistrate at Edmonton	48 00
May	H. Bose	270 00
"	Ontario Employment Agency	35 00
"	C. St. Geo. Yarwood	20 00
"	City of Vancouver	75 00
"	C. St. Geo. Yarwood	2 00
"	"	21 00
June	J. T. MacKay	150 00
"	H. Bell	50 00
"	D. H. Reynolds	75 00
"	"	20 00
"	H. Bose	41 00
"	C. St. Geo. Yarwood	10 00
"	G. E. Sanders	50 00
"	C. St. Geo. Yarwood	50 00
"	J. Cook	150 00
"	City of Toronto	285 00
"	J. C. Mitchell	210 00
"	Wm. Lindsay	5 00
July	City of Toronto	40 00
"	H. Bell	40 00
"	T. D. Cowper	686 00
"	"	82 00
"	Einnard Hannie	8 00
"	Waine Kangas	8 00
"	J. C. Mitchell	50 00
"	"	75 00
"	E. Willis	125 00
August	J. C. Mitchell	55 00
"	D. H. Reynolds	130 00
September	J. Farrer, P.M. at Parry Sound	15 00
"	City of Victoria	5 00
"	City of Winnipeg	100 00
October	T. D. Cowper	355 00
"	R. E. Plewman	25 00
November	J. C. Mitchell	686 00
"	Wm. Lindsay	5 00
"	J. H. Rodd	50 00
"	City of Winnipeg	50 00
"	City of Vancouver	120 00
"	Province of British Columbia	100 00
"	J. C. Mitchell	25 00
"	Province of Saskatchewan	2 00
"	City Treasurer, Vancouver, B.C.	600 00
December	J. T. MacKay	200 00
1915.		
January	T. D. Cooper	54 00
"	E. Willis	25 00
March	J. C. Mitchell	210 00
"	D. H. Reynolds	103 00
"	Alex. Fraser	60 00
"	Comm. Immigration, Winnipeg	10 00
		5,766 00
	Less Refunds	25 00
		5,741 00

GEO. D. POPE,
Controller of Revenue.

I.—STATEMENT of Chinese Immigration Revenue collected by Ports during the Fiscal Year, 1914-15.

Port.	Number of Chinese Exempts.	Paying Head Tax.		Registration for Leave.		Other Revenue.	Total Revenue.
		Number of Chinese.	Amount.	Number.	Amount.		
			$ cts.		$ cts.	$ cts.	$ cts.
Victoria	38	370	185,000 00	3,704	3,704 00		188,704 00
Vancouver	65	779	389,500 00	667	667 00		390,167 00
Montreal		1	500 00	1	1 00		501 00
Ottawa		4	2,000 00			6,251 00	8,251 00
Halifax		1	500 00	1	1·00		501 00
All ports	103	1,155	577,500 00	4,373	4,373 00	6,251 00	588,124 00

GEO. D. POPE,
Controller of Revenue.

J.—STATEMENT of Receipts received on account of Sales of Land, which amounts have been credited to the Special Accounts of the following Railway Companies, for the Fiscal Year ended March 31, 1915.

Railway Company.	Date of Order-in-Council.	Amount.	Total.
		$ cts.	$ cts.
Calgary and Edmonton Railway	August 17, 1908	170,894 10	
Qu'Appelle, Long Lake, and Saskatchewan Railway	May 8, 1907 July 10, 1907	164,054 30	
LakeManitoba Railway and Canal Company	December 5, 1908	204,762 75	
Canadian Northern Railway System			539,711 15

GEO. D. POPE,
Controller of Revenue.

K.—STATEMENT of Gross Cash Receipts on account of Dominion Lands Revenue, for the Fiscal Year ended March 31, 1915.

Month.	Homestead Fees.	Pre-emption and Purchased Homestead Fees.	Improvements.	General Sales of Land.	Timber Dues.	Rental from Grazing Lands.	Export Tax on Gold, Mining Fees, Hay, Coal, Petroleum, etc.	Canadian National Parks.	Survey Fees.	Map Sales, Rentals, Office Fees, and Miscellaneous	Total.
1914.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.
April	30,670 00	4,780 00	13,283 13	67,910 91	29,882 98	11,227 81	52,099 26	1,627 83	142 13	9,163 22	220,787 27
May	24,410 00	4,480 00	13,734 65	58,219 48	34,393 61	9,909 03	352,639 92	3,185 40	494 56	5,528 44	506,995 09
June	30,220 00	5,690 00	13,742 43	65,934 30	27,969 09	8,000 12	561,682 58	4,996 05	224 30	2,724 06	721,182 93
July	28,880 00	5,430 00	16,053 32	70,266 17	37,837 76	8,553 07	306,723 31	7,944 37	176 00	2,123 99	483,987 99
August	19,970 00	2,580 00	7,385 00	40,934 54	13,649 51	10,819 20	71,468 08	5,239 03	223 90	1,731 20	174,000 46
September	16,720 00	2,220 00	8,538 46	36,415 12	12,871 32	7,610 81	54,479 64	2,896 12	653 80	1,438 84	143,844 11
October	23,905 00	2,070 00	10,580 26	50,610 01	36,820 12	5,674 16	54,961 38	2,081 73	703 18	2,071 30	189,477 24
November	18,930 00	1,460 00	8,372 19	59,509 69	25,614 91	7,443 69	44,396 91	2,338 95	782 56	2,004 91	170,853 81
December	13,190 00	1,250 00	7,888 65	59,348 91	21,524 01	11,135 56	37,041 94	2,205 91	719 08	899 27	158,203 33
1915.											
January	8,720 00	870 00	4,983 28	57,185 55	20,980 19	6,902 84	24,227 36	2,180 23	1,217 78	979 32	128,246 55
February	8,575 00	810 00	4,667 25	40,802 71	17,831 08	6,846 30	17,366 81	959 73	417 96	1,550 92	99,827 76
March	14,105 00	1,230 00	5,753 55	83,985 17	28,559 71	7,587 99	23,367 90	2,240 62	3,852 67	9,297 58	179,980 19
	238,295 00	32,870 00	114,982 17	691,122 56	310,934 29	101,710 58	1,600,455 09	37,895 97	9,607 92	39,513 15	3,177,386 73

GEO. D. POPE,

Controller of Revenue.

L.—STATEMENT of Gross Receipts (cash and scrip) on account of Dominion Lands Revenue for Fiscal Year ended March 31, 1915, as compared with the previous year.

Particulars.	1914-15.	1913-14.	Increase.	Decrease.	Net. Decrease.
	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
Dominion Lands Agencies	1,066,269 30	1,842,480 10	.....	776,210 80	.....
Crown Timber Agencies	299,132 17	362,038 11	.....	62,905 94	.....
Hay, Mining, Coal, Grazing, etc	1,563,444 95	837,817 36	725,627 59	.....	.....
Yukon Territory	211,124 34	222,683 75	.....	11,559 41	.....
Canadian National Parks	37,895 97	48,800 33	.....	10,904 36	.....
	3,177,866 73	3,313,819 65	725,627 59	861,580 51	135,952 92

GEO. D. POPE,
Controller of Revenue.

No. 32.

REPORT OF SCHOOL LANDS BRANCH.

OTTAWA, June 12, 1915.

SIR,—I have the honour to submit the annual report of the business of the School Lands Branch for the fiscal year ending the 31st of March, 1915.

As you are aware, no general auction sales of school lands were held during the past fiscal year owing to the partial failure of the crop last season, and also to the prevailing financial depression. The only sales made were those to railway companies under the provisions of the Railway Act, and to boards of trustees of parcels of land required for school sites.

The total amount received from payments on account of sales during the fiscal year was as follows:—

Manitoba	$202,501 45
Saskatchewan	333,500 72
Alberta	222,557 02
	$758,559 19

GRAZING.

The total number of grazing permits issued during the fiscal year was 3,212, distributed as follows:—

Manitoba	92
Saskatchewan	2,058
Alberta	1,062
	3,212

The revenue from this source was $48,057.49.

COAL.

Eight coal leases were issued during the fiscal year, and the revenue from this source was $8,829.69.

HAY.

The number of hay permits issued was 3,876.

In addition to the hay permits, three leases of school lands for hay-cutting purposes were issued for a term of years, making the total revenue from this source $7,849.62.

PETROLEUM AND NATURAL GAS.

Nine hundred and eighty-four leases of the petroleum and gas rights in school lands were issued during the fiscal year, and the revenue derived therefrom was $104.568.

CULTIVATION PERMITS.

Twenty-one cultivation permits were issued for the cultivation of portions of school sections that had been broken by squatters and others, the revenue from this source being $299.52.

TIMBER.

The amount collected from this source was $3,809.64.

The total net revenue collected from the school lands in each province during the fiscal year was as follows:—

Manitoba	$206,551 86
Saskatchewan	372,957 50
Alberta	353,061 29
	$932,570 65

The total net revenue for the previous year was $1,207,015.23, showing a decrease for the fiscal year of $274,444.58. This was partly due to the financial stringency and the partial failure of the crop, and to the fact that no auction sales were held.

Under the provisions of the several Orders in Council in that behalf, the net revenue collected from the school lands in each province during the fiscal year, less the principal moneys of sales and less also the expenditure, was paid over to the Government of each province. The amounts paid over were arrived at as follows:—

Manitoba—	
Total net revenue	$206,551 86
Less principal moneys	135,339 41
Revenue other than principal moneys	$71,212 45
Less expenditure	10,709 81
Amount paid to province	$60,502 64
Saskatchewan—	
Total net revenue	$372,957 50
Less principal moneys	211,756 10
Revenue other than principal moneys	$161,201 40
Less expenditure	12,267 88
Amount paid to province	$148,933 52
Alberta—	
Total net revenue	$353,061 29
Less principal moneys	158,258 08
Revenue other than principal moneys	$194,803 21
Less expenditure	12,325 40
Amount paid to province	$182,477 81

In addition to the above sums the following amounts were paid to the Provincial Governments of Manitoba, Saskatchewan, and Alberta as interest on the School Lands Funds for the past fiscal year, namely:—

Manitoba	$109,061 65
Saskatchewan	91,051 42
Alberta	76,435 88
	$276,548 95

This makes the total sum paid to the Provincial Governments of Manitoba, Saskatchewan, and Alberta during the fiscal year on account of revenue collected and as interest on the funds as follows:—

Manitoba	$169,564 29
Saskatchewan	239,984 94
Alberta	258,913 69
	$668,462 92

Attached hereto are statements lettered "A," "B," and "C," respectively, showing duly classified the revenue collected from the school lands in the three provinces.

Statements "D," "E," and "F," hereto attached, show the balance standing to the credit of each of the School Lands Funds on the 1st of April, 1915, to be as follows:—

Manitoba	$3,686,966 91
Saskatchewan	3,063,063 02
Alberta	2,520,596 80
Total	$9,270,626 73

The following is an approximate statement of the work of the branch for the fiscal year:—

Letters sent out	27,199
Letters received	26,178
Leases prepared	996
Statements of account sent out	16,750
Receipts issued	4,424
Grazing permits issued	3,212
Cultivation permits issued	21
Assignments registered	380
Requisitions for patents	352
Requisitions for refunds	258

I have the honour to be, sir,

Your obedient servant,

FRANK S. CHECKLEY,

Controller.

STATEMENT A.—MANITOBA—Statement of Revenue Collected from School Lands for the Fiscal Year from April 1, 1914, to March 31, 1915, inclusive.

Month.	Sales.		Total.	Cultivation	Grazing.	Timber.	Hay.	Petroleum and N. Gas.	Registration Fees.	Total.
	Principal.	Interest.								
1914.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.
April	4,402 29	2,215 34	6,617 63	4 00	84 80					6,706 43
May	4,368 82	2,419 85	6,788 67		28 80					6,817 47
June	14,755 08	10,926 48	25,681 56	2 00	77 10					25,760 66
July	12,648 51	6,483 64	19,132 15	14 00	6 40					19,152 55
August	3,431 94	968 40	4,400 34		25 60		2 00			4,427 94
September	4,970 70	1,332 40	6,303 10		11 73					6,314 83
October	13,382 42	6,242 28	19,624 70		10 40					19,635 10
November	38,590 91	20,669 43	59,260 34							59,260 34
December	23,948 45	9,726 28	33,674 73		5 00					33,679 73
1915.										
January	3,031 57	2,315 67	5,347 24		58 72					5,405 96
February	1,252 83	482 09	1,734 92	29 00	189 67					1,953 59
March	9,786 08	2,841 80	12,627 88	20 50	112 12					12,760 50
	134,569 60	66,623 66	201,193 26	69 50	610 34		2 00			201,875 10
Agencies	2,313 81	904 24	3,218 05		794 20	1,502 57	1,343 30	5 00		6,863 12
	136,883 41	67,527 90	204,411 31	69 50	1,404 54	1,502 57	1,345 30	5 00		208,738 22
Registration Fees									149 50	149 50
	136,883 41	67,527 90	204,411 31	69 50	1,404 54	1,502 57	1,345 30	5 00	149 50	208,887 72
Fees transferred to Dom. Lands						23 00	257 50			280 50
	136,883 41	67,527 90	204,411 31	69 50	1,404 54	1,479 57	1,087 80	5 00	149 50	208,607 22
Refunds	1,544 00	365 86	1,909 86	15 00	48 00	50 00	12 50			2,035 36
Total	135,339 41	67,162 04	202,501 45	54 50	1,356 54	1,429 57	1,075 30	5 00	149 50	206,571 86
Refund of amount received during Fiscal Year, 1910-11, on account of application for gravel lease										20 00
Grand Total										206,551 86

FRANK S. CHECKLEY,
Collector.

STATEMENT B—SASKATCHEWAN.—Statement of Revenue collected from School Lands for the Fiscal Year from April 1, 1914, to March 31, 1915, inclusive.

Month.	Sales.		Total.	Cultivation.	Grazing.	Timber.	Hay.	Coal.	Petroleum and Natural Gas.	Registration Fees.	Total.
	Principal.	Interest.									
1914.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
April	9,669 17	3,523 78	13,192 95	23 50	2,635 88						15,852 33
May	13,151 31	5,686 85	18,838 16		1,137 06						19,975 22
June	60,667 14	29,653 39	90,320 53	11 50	863 84		1 00	93 17			91,290 04
July	25,371 55	14,693 93	40,065 48		921 95		1 00		83 87		41,072 30
August	1,346 25	1,234 53	2,580 78		185 31			48 00	825 00		3,639 09
September	5,565 03	2,396 80	7,961 83		209 01				330 00		8,500 84
October	16,895 06	10,552 99	27,448 05		230 05						27,678 10
November	39,296 42	21,317 17	60,613 59	45 00	190 68	2 00					60,851 27
December	20,348 98	14,593 15	34,942 13		448 68		1 10	5 00	1 85		35,398 76
1915.											
January	7,714 12	8,232 57	15,946 69	16 00	4,141 36						20,104 05
February	5,740 07	3,302 87	9,042 94		4,357 55						13,400 49
March	8,066 94	3,957 12	12,024 06	60 00	4,692 81		40 00				16,816 87
	213,832 04	119,145 15	332,977 19	156 00	20,014 18	2 00	43 10	146 17	1,240 72		354,579 36
Agencies	2,111 42	2,707 17	4,818 59	24 50	9,187 94	382 37	5,824 40	985 21	3,820 46		25,043 47
	215,943 46	121,852 32	337,795 78	180 50	29,202 12	384 37	5,867 50	1,131 38	5,061 18		379,622 83
Registration Fees										198 50	198 50
	215,943 46	121,852 32	337,795 78	180 50	29,202 12	384 37	5,867 50	1,131 38	5,061 18	198 50	379,821 33
Fees transferred to Dominion Lands						11 50	1,211 00				1,222 50
	215,943 46	121,852 32	337,795 78	180 50	29,202 12	372 87	4,656 50	1,131 38	5,061 18	198 50	378,598 83
Refunds	4,187 36	107 70	4,295 06		903 32	12 00	66 60	53 00	271 35		5,601 33
Total	211,756 10	121,744 62	333,500 72	180 50	28,298 80	360 87	4,589 90	1,078 38	4,789 83	198 50	372,997 50
Refund of amount received during fiscal year 1913-14 on account, application for Fire Clay Lease											40 00
Grand total											372,957 50

FRANK S. CHECKLEY,
Controller of School Lands Branch.

STATEMENT C—ALBERTA.—Statement of Revenue collected from School Lands for the Fiscal Year from April 1, 1914, to March 31, 1915, inclusive.

Month.	Sales.		Total.	Cultivation.	Grazing.	Timber.	Hay.	Coal.	Petroleum and Natural Gas.	Registration Fees.	Total.
	Principal.	Interest.									
1914.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
April	6,225 83	2,552 40	8,778 23	.....	1,438 31	.....	.....	811 90	.....	.....	11,028 44
May	9,437 66	5,769 98	15,207 64	1 00	1,246 88	.....	.....	96 00	.....	.....	16,551 52
June	17,167 82	7,185 27	24,353 09	.....	537 08	.....	.....	50 00	.....	.....	24,940 17
July	26,462 52	9,886 14	36,348 66	.....	384 13	.....	.....	540 60	490 00	.....	37,763 39
August	9,069 46	3,664 26	12,733 72	.....	93 72	1 00	.....	.....	971 00	.....	13,799 44
September	4,956 09	1,014 79	5,970 88	.....	111 98	518 65	.....	322 80	402 00	.....	7,326 31
October	22,443 60	7,739 51	30,183 11	.....	137 94	0 50	.....	1,083 05	347 69	.....	31,752 29
November	35,741 76	9,833 51	45,575 27	.....	152 44	18 65	0 80	74 00	0 68	.....	45,821 84
December	10,913 78	6,317 15	17,230 93	.....	147 05	0 10	.....	32 40	2 25	.....	17,412 73
1915.											
January	2,877 43	2,356 80	5,234 23	.....	1,498 62	.....	62 52	1,630 35	39 05	.....	8,464 67
February	4,258 97	1,722 17	5,981 14	.....	1,634 72	32 75	2 50	255 00	100 00	.....	8,006 11
March	6,749 62	4,951 35	11,700 97	4 60	1,638 90	1 40	.....	330 70	46 00	.....	13,722 57
	156,304 54	62,993 33	219,297 87	5 60	9,021 77	573 05	65 72	5,226 80	2,398 67	.....	236,589 48
Agencies	2,196 07	1,384 74	3,580 81	58 92	9,868 78	1,473 25	2,598 90	2,539 51	99,924 80	.....	120,044 97
	158,500 61	64,378 07	222,878 68	64 52	18,890 55	2,046 30	2,664 62	7,766 31	102,323 47	.....	356,634 45
Registration Fees	.....	.....	.....	.....	.....	.....	.....	.....	.....	349 50	349 50
	158,500 61	64,378 07	222,878 68	64 52	18,890 55	2,046 30	2,664 62	7,766 31	102,323 47	349 50	356,983 95
Fees transferred to Dominion Lands	.....	.....	.....	.....	.....	3 50	469 50	.....	.....	.....	473 00
	158,500 61	64,378 07	222,878 68	64 52	18,890 55	2,042 80	2,195 12	7,766 31	102,323 47	349 50	356,510 95
Refunds	242 53	79 13	321 66	.....	488 40	23 60	10 70	15 00	2,550 30	.....	3,409 66
Total	158,258 08	64,298 94	222,557 02	64 52	18,402 15	2,019 20	2,184 42	7,751 31	99,773 17	349 50	353,101 29
Refund of amount received during fiscal year 1912-13 on account of application for Fire Clay Lease	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	40 00
Grand total	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	353,061 29

FRANK S. CHECKLEY,
Controller of School Lands Branch.

SESSIONAL PAPER No. 25

STATEMENT D—ALBERTA SCHOOL LANDS.—Statement of Revenue and Expenditure on account of School Lands for Fiscal Year ended March 31, 1915.

Particulars.	Period.	Dr.	Cr.
		$ cts.	$ cts.
By Balance on April 1, 1914			2,362,338 72
" Sales	12 months ended Mar. 31, 1915.		222,557 02
" Cultivation permits	" " "		64 52
" Timber dues, hay permits, grazing rental	" " "		22,605 77
" Coal, petroleum, and natural gas	" " "		107,484 48
" Registration fees	" " "		349 50
" Interest on fund	" " "		76,435 88
To Cost of management at Ottawa	" " "	5,558 75	
" Salaries, printing, advertising, and general expenses	" " "	6,766 65	
" Revenue and interest paid Alberta Government	" " "	182,477 81	
" Interest on fund paid Alberta Government	" " "	76,435 88	
" Balance on March 31, 1915		2,520,596 80	
		2,791,835 89	2,791,835 89

FRANK S. CHECKLEY,
Controller.

STATEMENT E—SASKATCHEWAN SCHOOL LANDS.—Statement of Revenue and expenditure on account of Saskatchewan School Lands for Fiscal Year ended March 31, 1915.

Particulars.	Period.	Dr.	Cr.
		$ cts.	$ cts.
By Balance on April 1, 1914	12 months ended Mar. 31, 1915.		2,851,306 92
" Sales	" " "		333,500 72
" Cultivation permits	" " "		180 50
" Timber dues, hay permits, and grazing rentals, coal, petroleum, fire clay, sand, gravel, and miscellaneous	" " "		39,077 78
" Registration fees	" " "		198 50
" Interest on fund	" " "		91,051 42
To Cost of management at Ottawa	" " "	5,558 75	
" Salaries, printing, advertising, and general expenses	" " "	6,709 13	
" Revenue and interest paid to Saskatchewan Government	" " "	148,933 52	
" Interest on fund paid to Saskatchewan Government	" " "	91,051 42	
" Balance on March 31, 1915		3,063,063 02	
		3,315,315 84	3,315,315 84

FRANK S. CHECKLEY,
Controller.

STATEMENT F—MANITOBA SCHOOL LANDS.—Statement of Revenue and Expenditure on account of Manitoba School Lands for Fiscal Year ended March 31, 1915.

Particulars.	Period.	Dr.	Cr.
		$ cts.	$ cts.
By Balance on April 1, 1914			3,551,627 50
" Sales	12 months ended Mar. 31, 1915.		202,501 45
" Cultivation permits	" " "		54 50
" Timber dues, hay permits, grazing rentals and petroleum	" " "		3,846 41
" Registration fees	" " "		149 50
" Interest on fund	" " "		109,061 65
To Cost of management at Ottawa	" " "	5,558 75	
" Salaries, printing, advertising and general expenses	" " "	5,151 06	
" Revenue and interest paid to Manitoba Government	" " "	60,502 64	
" Interest on fund paid to Manitoba Government	" " "	109,061 65	
" Balance on March 31, 1915		3,686,966 91	
		3,867,241 01	3,867,241 01

FRANK S. CHECKLEY,
Controller.

REPORT OF THE LAND PATENTS BRANCH.

OTTAWA, June 30, 1915.

W. W. CORY, Esq., C.M.G.,
Deputy Minister of the Interior,
Ottawa.

SIR,—I have the honour to submit my report on the work performed in the Land Patents Branch of the Department of the Interior during the twelve months which ended on March 31, 1915, and the several statements in relation thereto, marked A to W, inclusive.

LETTERS PATENT.

The number of letters patent issued during the period mentioned was 24,260, covering an area of 3,996,013 acres, which may be classified as follows:—

Province.	Patents.	Acres.
Manitoba	1,354	204,232
Saskatchewan	13,536	2,205,591
Alberta	9,013	1,554,039
British Columbia	330	30,910
Yukon Territory	27	1,241
	24,260	3,996,013

These grants, which are given in detail in the statements marked A to G, inclusive, may be summarized as follows:—

Grants.	Patents.	Acres.
Homesteads	20,907	3,544,763
Sales	1,252	118,072
Pre-emption sales	812	128,970
Purchased homesteads	493	77,511
Railways	469	105,190
Free grants	186	9,166
Hudson's Bay Company	19	9,888
Northwest half-breeds	17	2,419
Licenses of occupation	14	34
Quit claims	91	
	24,260	3,996,013

There was a decrease of 6,793 patents and 1,196,128 acres, as compared with the preceding year.

There are recorded in the Land Patents Branch, 319,736 letters patent, aggregating 79,150,266 acres, which have been issued since 1873 to March 31, 1915. The accompanying statement marked "H" shows the number of patents issued each year during that period, with the acreage patented during each of such years.

LANDS DISPOSED OF.

Twenty-seven thousand two hundred and ninety-five entries recorded in this branch were granted during the year, aggregating an approximate area of 4,366,480 acres, made up as follows:—

——			Acres.
Homestead entries:—			
Manitoba	4,420		
Saskatchewan	8,790		
Alberta	10,076		
British Columbia	802		
		24,088	3,854,080
Pre-emption entries:—			
Saskatchewan	2,108		
Alberta	737		
		2,845	455,200
Purchased Homesteads:—			
Saskatchewan	233		
Alberta	117		
		350	56,000
Halfbreed Scrip Locations:—			
Manitoba	2		
Saskatchewan	3		
Alberta	7		
		12	1,200
		27,295	4,366,480

There was a decrease in the number of homestead entries granted, as compared with the previous year, of 7,741 entries.

By land agencies, the 24,088 homestead entries were made up as follows:—

Manitoba—	
Brandon	48
Dauphin	1,313
Winnipeg	3,059
	4,420
Saskatchewan—	
Battleford	1,244
Estevan	50
Humboldt	768
Maple Creek	992
Moosejaw	1,183
Prince Albert	1,567
Regina	131
Saskatoon	815
Swift Current	732
Weyburn	445
Yorkton	863
	8,790
Alberta—	
Calgary	989
Edmonton	5,629
Grand Prairie	898
Lethbridge	257
Medicine Hat	447
Peace River	1,061
Red Deer	795
	10,076
British Columbia—	
Kamloops	446
New Westminster	219
Revelstoke	137
	802

The 24,088 entrants for homesteads represented 56,218 persons, as compiled from the information obtained from each entrant. Of these entries, 4,955 were made by residents of the several provinces of the Dominion, 48 by Canadians who had returned from the United States, and 3,639 by persons who had obtained homestead entries but which had either been cancelled by default or at the request of the entrants in order, in most cases, to enter for other lands; 4,137 were made by persons from the British Isles, 4,286 by Americans, 2,879 by Austro-Hungarians, 1,332 by Russians, 645 by Norwegians, 628 by Swedes, 474 by Germans, 251 by Frenchmen, 109 by Belgians, and the remaining 705 homesteads were made by citizens of various other countries.

CANCELLED ENTRIES.

There were cancelled during the same period, 15,099 entries, comprising 12,514 homestead entries (Manitoba 1,694, Saskatchewan 4,953, Alberta 5,432, and British Columbia 435), 2,454 pre-emption entries (Saskatchewan 1,517, Alberta 937), 122 purchased homestead entries (Saskatchewan 73, Alberta 49), and sales 9.

SALES.

Seven hundred and twenty-four sales were made during the fiscal year for 25,702 acres of land, with an average for each sale of 35·5 acres.

Newly Surveyed Lands Thrown Open to Homestead Entry.

During the past fiscal year newly surveyed lands comprised in 352 townships were made available for homestead entry in the following land agencies:—

Province.	Agency.	Township.
Manitoba	Dauphin	22
	Winnipeg	47
Saskatchewan	Battleford	17
	Prince Albert	6
	Saskatoon	1
	Swift Current	2
	Moosejaw	5
	Yorkton	3
Alberta	Calgary	6
	Edmonton	43
	Grande Prairie	21
	Grouard	85
	Lethbridge	2
	Red Deer	2
British Columbia	Kamloops	69
	New Westminster	17
	Revelstoke	4
		352

ACCOUNTS AND REVENUE.

There are at present kept in the branch about 50,000 accounts in connection with purchased homesteads, pre-emptions and ordinary sales, and some 45,000 seed grain and provision accounts.

During the fiscal year, $637,801.34, including $35,306.11 for interest on deferred payments, was received on account of the sales above mentioned, and $63,801.06, including $8,863.12 on account of interest, was received in payment for seed grain and provisions liens, being a decrease on the total sum collected as compared with last year of $600,838.97.

REFUNDS.

In connection with the sales and moneys collected for the value of improvements on cancelled homesteads, there were 2,962 refunds made, amounting to $169,173.99, including 2,037 refunds amounting to $118,204.56 on account of improvements, and in connection with seed grain accounts, eighty-eight refunds amounting to $2,311. The latter refunds were mostly made for duplicate payments and for payments which had been sent to the department instead of to the provincial authorities, by whom, in these cases, the seed grain had been advanced to the settlers, while the refunds made on account of sales were for overpayments or payments made in advance on account of purchased homesteads or pre-emptions.

The following is a summary showing, approximately, the work performed in the Land Patents Branch during the fiscal year ended March, 1915:—

Files dealt with	179,355
Letters sent, written in the branch	31,232
Letters sent, written in the assistant secretary's office	10,075
Notices sent patentees	25,509
Notices with statements of account sent to purchasers and Dominion Lands Agents	23,108
Patents issued	24,260
Land entries checked and posted	28,500

Entries cancelled and recorded	15,099
Receipts issued	2,290
Requisitions for refunds prepared	2,962
Payments amounting to about $637,801.34 checked and posted	.....
Assignments registered	396
Instruments appointing substitutes under the Volunteer Bounty Act, 1908, registered	2
Applications to purchase land dealt with	900
Seed grain certificates issued	1,514
Seed grain discharges issued	931
Certified copies of patents prepared	101
Preliminary plans sent to the different land agencies	352

A great number of plans and sketches were prepared, as well as memoranda to Council and special reports, etc., of which no record was kept.

I have the honour to be, sir,

Your obedient servant,

N. O. COTE,

Controller of Land Patents Branch and

Registrar of Dominion Lands Patents.

A.—STATEMENT OF LETTERS PATENT covering Dominion Lands situate in Manitoba, Saskatchewan, Alberta, Northwest Territories, British Columbia and the Yukon Territory, issued from the Department of the Interior during the Fiscal Year ending March 31, 1915, as compared with the Fiscal Year ending March 31, 1914, and recorded in the Land Patents Branch.

No.	Nature of Grant.	From April 1, 1914, to March 31, 1915.		From April 1, 1913, to March 31, 1914.	
		Patents.	Acres.	Patents.	Acres.
1	Alberta Railway and Irrigation Co's sales	53	13,047	92	31,252
2	British Columbia homesteads	198	27,051	188	26,529
3	British Columbia sales	98	2,974	63	1,678
4	Coal lands sales	3	963	2	218
5	Coal surface sales	2	22	1	10
6	Commutation grants			1	93
7	Homesteads	20,705	3,516,815	27,721	4,743,249
8	Hudson's Bay Co	19	9,888	43	20,110
9	Leases			2	150
10	License of occupation	14	34	43	746
11	Military bounty grants	5	801	7	1,122
12	Military homesteads	2	640	5	1,600
13	Mining lands sales	10	13,178	31	3,438
14	Mineral rights (6,432 acres)	25		53	
15	Northwest half-breed grants	17	2,419	45	5,485
16	Northwest Mounted Police grants			1	160
17	Parish sales	2	191	3	181
18	Pre-emption sales	812	128,970	319	50,826
19	Purchased homesteads	493	77,511	466	73,840
20	Quit claim, special grants (7,866 acres)	91		15	
	Railways—				
21	Alberta Central Railway Co	3	19	7	68
22	Calgary and Edmonton Railway Co	101	27,091	57	17,374
23	Canadian Northern Alberta Railway Co			58	800
24	Canadian Northern Branch Lines Co			1	3
25	Canadian Northern Railway Co	79	40,127	67	16,611
26	Canadian Northwestern Railway Co			2	26
27	Canadian Pacific Railway grants	68	697	89	2,840
28	Canadian Pacific Railway roadbed and station grounds	9	94	5	33
29	Edmonton Dunvegan and British Columbia Railway Co	9	127		
30	Grand Trunk Pacific Railway	1	1,439	26	662
31	Grand Trunk Pacific Branch Lines Co	28	339	38	211
32	Kootenay Central Railway Co	16	192		
33	Manitoba Railway Co	1	6		
34	Manitoba and Northwestern Railway Co	1	3	7	1,605
35	Manitoba Southwestern Colonization Railway Co			4	188
36	Qu'Appelle, Long Lake and Saskatchewan Railroad and Steamboat Co	153	35,056	165	43,041
37	Sales	718	43,631	866	99,645
38	School lands sales	316	43,082	326	36,542
39	Special grants	181	8,365	213	11,113
40	Yukon Territory homesteads	2	257		
41	Yukon Territory sales	25	894	21	692
	Totals	24,260	3,996,013	31,053	5,192,141

N. O. COTE,

Controller and Registrar of Dominion Lands Patents.

B.—Statement of Letters Patent covering Dominion Lands situate in the Province of Manitoba, issued from the Department of the Interior during the Fiscal Year ending March 31, 1915, as compared with the Fiscal Year ending March 31, 1914, and recorded in the Land Patents Branch.

No.	Nature of Grant.	From April 1, 1914, to March 31, 1915.		From April 1, 1913, to March 31, 1914.	
		Patents.	Acres.	Patents.	Acres.
1	Commutation grants			1	93
2	Homesteads	1,199	188,384	1,277	198,462
3	Hudson's Bay Co	3	2,401	13	8,967
4	Leases			1	
5	Military homesteads	1	320	1	320
6	Mining lands sales			13	995
7	Northwest half-breed grants	1	160	1	160
8	Parish sales	2	191	3	181
9	Pre-emption sales	2	321	4	650
10	Quit claim, special grants (152 acres)	3			
	Railways—				
11	Canadian Northern Railway Co	13	212	3	12
12	Canadian Northern Branch Lines Co			1	3
13	Canadian Pacific Railway grants	1	12	4	198
14	Canadian Pacific Railway roadbed and station grounds	3	50	3	13
15	Manitoba Railway Co	1	6		
16	Manitoba and Northwestern Railway Co			1	5
17	Manitoba Southwestern Colonization Railway Co			3	24
18	Sales	61	3,398	82	3,994
19	School lands sales	53	8,030	60	10,404
20	Special grants	11	747	13	1,065
	Totals	1,354	204,232	1,484	225,546

N. O. COTE,

Controller and Registrar of Dominion Lands Patents.

SESSIONAL PAPER No. 25

C.—Statement of Letters Patent covering Dominion Lands situate in the Province of Saskatchewan, issued from the Department of the Interior during the Fiscal Year ending March 31, 1915, as compared with the Fiscal Year ending March 31, 1914, and recorded in the Land Patents Branch.

No.	Nature of Grant.	From April 1, 1914, to March, 31, 1915.		From April 1, 1913, to March 31, 1914.	
		Patents.	Acres.	Patents.	Acres.
1	Homesteads	11,763	1,987,576	16,361	2,791,708
2	Hudson's Bay Co	10	5,615	16	5,096
3	Lieense of occupation	11	23	8	520
4	Military homesteads	.....	.....	3	960
5	Mining lands sales	.....	.....	1	40
6	Mineral rights (30 acres)	1	.....	1	
7	Northwest half-breed grants	7	1,153	13	1,828
8	Pre-emption sales	537	43,610	249	39,656
9	Purchased homesteads	358	56,098	361	57,304
10	Quit claim, special grants (7,276) cares	71	.....	15	
	Railways—				
11	Calgary and Edmonton Railway Co	14	523	.....	
12	Canadian Northern Railway Co	47	39,658	47	16,214
13	Canadian Paeifie Railway grants	10	65	78	1,410
14	Grand Trunk Pacific Railway	1	1,439	5	55
15	Grand Trunk Paeific Branch Lines Co	10	66	36	207
16	Manitoba and Northernwestern Railway Co.	1	3	6	1,599
17	Qu'Appelle Long Lake and Saskatchewan Railroad and Steamboat Co	153	35,056	165	43,041
18	Sales	356	22,208	494	55,396
19	School lands sales	120	10,659	182	17,908
20	Special grants	66	1,839	115	3,284
	Totals	13,536	2,205,591	18,156	3,036,226

N. O. COTE,

Controller and Registrar of Dominion Lands Patents.

D.—Statement of Letters Patent covering Dominion Lands situate in the Province of Alberta, issued from the Department of the Interior during the Fiscal Year ending March 31, 1915, as compared with the Fiscal Year ending March 31, 1914, and recorded in the Land Patents Branch.

No.	Nature of Grant.	From April 1, 1914, to March 31, 1915.		From April 1, 1913, to March 31, 1914.	
		Patents.	Acres.	Patents.	Acres.
1	Alberta Railway and Irrigation Co's sales	53	13,047	92	31,252
2	Coal lands sales	3	963	2	218
3	Coal surface sales	2	22	1	10
4	Homesteads	7,743	1,340,855	10,083	1,753,079
5	Hudson's Bay Co	6	1,872	8	5,92
6	Leases			1	150
7	License of occupation	3	11	35	226
8	Military bounty grants	5	801	7	1,122
9	Military homesteads	1	320	1	320
10	Mining lands sales	10	13,178	16	2,242
11	Mineral rights (6,402 acres)	24		52	
12	Northwest half-breed grants	9	1,106	31	3,497
13	Northwest Mounted Police grants			1	160
14	Pre-emption sales	273	85,039	66	10,520
15	Purchased homesteads	135	21,413	105	16,536
16	Quit claim, special grants (438 acres)	17			
	Railways—				
17	Alberta Central Railway Co	3	19	7	68
18	Calgary and Edmonton Railway Co	87	26,568	57	17,374
19	Canadian Northern Alberta Railway Co			58	800
20	Canadian Northern Railway Co	19	257	17	385
21	Canadian Northwestern Railway Co			2	26
22	Canadian Pacific Railway grants	50	566	6	1,225
23	Edmonton Dunvegan and British Columbia Railway Co	9	127		
24	Grand Trunk Pacific Railway			21	607
25	Grand Trunk Pacific Branch Lines Co	18	273	2	4
26	Manitoba Southwestern Colonization Railway Co			1	165
27	Sales	301	18,025	290	40,255
28	School lands sales	143	24,393	84	8,230
29	Special grants	99	5,184	84	6,718
	Totals	9,013	1,554,039	11,130	1,901,109

N. O. COTE,

Controller and Registrar of Dominion Lands Patents.

E.—Statement of Letters Patent covering Dominion Lands situate in the Province of British Columbia issued from the Department of the Interior during the Fiscal Year ending March 31, 1915, as compared with the Fiscal Year ending March 31, 1914, and recorded in the Land Patents Branch.

No.	Nature of Grant.	From April 1, 1914, to March 31, 1915.		From April 1, 1913, to March 31, 1914.	
		Patents.	Acres.	Patents.	Acres.
1	British Columbia homesteads	198	27,051	188	26,529
2	British Columbia sales	98	2,974	63	1,678
3	Mining lands sales			1	161
	Railways—				
4	Canadian Pacific Railway grants	7	54	1	7
5	Canadian Pacific Railway roadbed and station grounds	6	44	2	20
6	Kootenay Central Railway Co	16	192		
7	Special grants	5	595	1	46
	Totals	330	30,910	256	28,441

N. O. COTE,

Controller and Registrar of Dominion Lands Patents.

F.—Statement of Letters Patent covering Dominion Lands situate in the Yukon Territory, issued from the Department of the Interior during the Fiscal Year ending March 31, 1915, as compared with the Fiscal Year ending March 31, 1914, and recorded in the Land Patents Branch.

No.	Nature of Grant.	From April 1, 1914, to March 31, 1915.		From April 1, 1913, to March 31, 1914.	
		Patents.	Acres.	Patents.	Acres.
1	Yukon Territory homesteads	2	257		
2	Yukon Territory sales	25	984	21	692
	Totals	27	1,241	21	692

N. O. COTE,

Controller and Registrar of Dominion Lands Patents.

G.—STATEMENT OF LETTERS PATENT covering Dominion Lands situate in the North-west Territories issued from the Department of the Interior during the Fiscal Year ending March 31, 1915, as compared with the Fiscal Year ending March 31, 1914, and recorded in the Land Patents Branch.

No.	Nature of Grant.	From April 1, 1914, to March 31, 1915.		From April 1, 1913, to March 31, 1914.	
		Patents.	Acres.	Patents.	Acres.
1	Hudson's Bay Co.			6	127

N. O. COTE,
Controller and Registrar of Dominion Lands Patents.

H.—STATEMENT showing the number of Letters Patent issued by the Department of the Interior for Dominion Lands since 1873, and the number of acres patented.

Period.	No. of patents issued.	Acreage.
1873, May to 31st December	420	67,200
1874, 1st January to 31st December	577	92,320
1875, 1st " " 31st October	464	74,240
1876, year ended 31st October	318	50,880
1877, " " " "	2,437	478,840
1878, " " " "	2,357	462,880
1879, " " " "	2,663	426,080
1880, " " " "	1,084	173,440
1881, " " " "	1,885	400,862
1882, " " " "	2,197	506,785
1883, " " " "	4,341	831,341
1884, " " " "	3,896	909,604
1885, " " " "	3,533	898,464
1886, " " " "	4,570	942,055
1887, " " " "	4,599	1,071,364
1888, " " " "	3,275	647,644
1889, " " " "	3,282	661,636
1890, " " " "	3,273	626,019
1891, " " " "	2,449	411,073
1892, " " " "	2,955	549,257
1893, " " " "	2,936	502,601
1894, " " " "	2,553	420,238
1894, November and December	413	66,102
1895, year ended 31st December	2,118	348,964
1896, " " " "	2,665	531,861
1897, " " " "	2,972	499,859
1898, " " " "	3,037	646,671
1899, " " " "	3,904	714,748
1st January, 1900, to 30th June	1,970	310,501
1901, year ended 30th June	6,461	6,846,857
1902, " " " "	8,768	4,711,104
1903, " " " "	7,349	3,266,388
1904, " " " "	6,890	2,982,579
1905, " " " "	8,798	6,197,354
1906, " " " "	12,370	4,181,345
1st July, 1906, to 31st March, 1907	10,596	2,361,330
1908, year ended 31st March	18,690	6,138,977
1909, " " " "	22,431	4,215,326
1910, " " " "	22,854	3,662,259
1911, " " " "	21,754	3,710,288
1912, " " " "	19,354	3,155,388
1913, " " " "	24,965	4,209,388
1914, " " " "	31,053	5,192,141
1915, " " " "	24,260	3,996,013
	319,736	79,150,266

N. O. COTE, *Controller.*

I.—STATEMENT.—Showing the number of Letters Patent forwarded to the several Registrars of the Land Registration Districts of the Provinces of Alberta, Saskatchewan and the Yukon Territory.

Registration Districts.	Number of Patents sent to Registrars.	Registration Districts.	Number of Patents sent to Registrars.
Assiniboia	839	Swift Current	865
East Saskatchewan	921	Cannington	58
West Saskatchewan	1,190	North Alberta	4,042
Yorkton	644	South Alberta	4,982
Humboldt	636	Yukon	27
Saskatoon	2,675	Moosomin	64
Moosejaw	6,182	Northwest Territories	0
			23,125

N. O. COTE,
Controller.

J.—STATEMENT showing the number of Homestead Entries made during the Fiscal Year 1914-15, as compared with Fiscal Year 1913-14.

Agency.	MANITOBA.		SASKATCHEWAN.		ALBERTA.		BRITISH COLUMBIA.	
	1914-15.	1913-14.	1914-15.	1913-14.	1914-15.	1913-14.	1914-15.	1913-14.
Battleford			1,244	1,650				
Brandon	48	43						
Calgary					989	1,755		
Dauphin	1,313	799						
Edmonton					5,629	5,745		
Estevan			50	218				
Grand Prairie					898	818		
Humboldt			768	930				
Kamloops							446	1,402
Lethbridge					257	388		
Maple-Creek			992	2,775				
Medicine Hat					447	1,158		
Moose Jaw			1,183	2,000				
New Westminster							219	529
Peace River					1,061	1,226		
Prince Albert			1,567	2,189				
Regina			131	232				
Red Deer					795	1,118		
Revelstoke							137	
Saskatoon			815	1,288				
Swift Current			732	2,041				
Weyburn			445	409				
Winnipeg	3,059	2,344						
Yorkton			863	772				
Total	4,420	3,186	8,790	14,504	10,076	12,208	802	1,93

Number of entries:—	
1914-13	31,829
1914-15	24,088
Net decrease for Fiscal Year 1914-15	7,741

RECAPITULATION.

MONTH.	MANITOBA.		SASKATCHEWAN.		ALBERTA.		BRIT. COLUM.	
	1914-15.	1913-14.	1914-15.	1913-14.	1914-15.	1913-14.	1914-15.	1913-14.
1914.								
April	434	279	1,166	1,637	1,381	1,332	83	212
May	318	227	875	1,532	1,193	1,139	52	581
June	384	302	1,262	1,811	1,275	1,331	99	363
July	397	350	1,178	1,720	1,241	1,405	66	202
August	322	259	757	1,231	831	1,059	91	101
September	362	221	436	840	800	974	133	116
October	644	317	885	1,150	813	1,097	52	71
November	540	365	624	1,417	675	983	55	63
December	292	307	571	1,168	572	897	46	52
1915.								
January	195	200	327	669	340	562	39	60
February	199	138	293	533	351	515	25	59
March	333	221	416	796	604	914	61	51
Total	4,420	3,186	8,790	14,504	10,076	12,208	802	1,931

N. O. COTE,
Controller.

SESSIONAL PAPER No. 25

K.—STATEMENTS showing number of Homestead Entries granted in the Provinces of Manitoba, Saskatchewan, Alberta and British Columbia for Fiscal Year 1914-15, as compared with Fiscal Year 1913-14.

Agency.	1914-1915.	1913-1914.	Increase.	Decrease.	Total, 1914-1915.	Total, 1913-1914.	Increase, 1914-1915.	Decrease. 1913-1914.
Manitoba.								
Brandon	48	43	5					
Dauphin	1,313	799	514					
Winnipeg	3,059	2,344	715					
Total	4,420	3,186	1,234		4,420	3,186	1,234	
Saskatchewan.								
Battleford	1,244	1,650		406				
Estevan	50	218		168				
Humboldt	768	930		162				
Maple-Creek	992	2,775		1,783				
Moosejaw	1,183	2,000		817				
Prince Albert	1,567	2,189		622				
Regina	131	332		101				
Saskatoon	815	1,288		473				
Swift Current	732	2,041		1,309				
Weyburn	445	409	36					
Yorkton	863	772	91					
Total	8,790	14,504	127	5,841	8,790	14,504		5,714
Alberta.								
Calgary	989	1,755		766				
Edmonton	5,629	5,745		116				
Grand Prairie	898	818	80					
Lethbridge	857	388		131				
Medicine Hat	447	1,158		711				
Peace River	1,061	1,226		165				
Red Deer	795	1,118		323				
Total	10,076	12,208	80	2,212	10,076	12,208		2,132
British Columbia.								
Kamloops	446	1,402		956				
New Westminister	319	529		310				
Revelstoke	137		137					
Total	802	1,931	137	1,266	802	1,931		1,129

Grand total for fiscal year 1914-15	24,088
" " " 1913-14	31,829
Net decrease for fiscal year 1914-15	7,741

N. O. COTE,
Controller.

L.—STATEMENT showing the number of Homestead Entries made during the fiscal years ended March 31, 1914 and 1915, and the Nationality of the Homesteaders as registered by the several Agencies of the Department in Manitoba, Saskatchewan, Alberta and British Columbia.

Nationalities.	No. of entries 1914.	No. of entries 1915.
Canadians from Ontario	2,996	2,009
" Quebec	883	648
" Nova Scotia	258	196
" New Brunswick	182	117
" Prince Edward Island	105	60
" Manitoba	889	1,032
" Saskatchewan	709	383
" Alberta	551	434
" British Columbia	104	76
Persons who had previous entry	4,411	3,639
Newfoundlanders	6	15
Canadians returned from the United States	121	48
Americans	7,172	4,286
English	3,894	2,974
Scotch	966	800
Irish	400	363
French	343	251
Belgians	143	109
Swiss	91	83
Italians	96	108
Roumanians	82	38
Syrians	29	16
Germans	887	474
Austro-Hungarians	2,516	2,879
Hollanders	143	104
Danes (other than Icelanders)	245	149
Icelanders	50	70
Swedes	842	628
Norwegians	1,062	645
Russians	1,586	1,332
Turks	5	8
Serbians	4	4
Bulgarians	7	5
Chinese	5	3
Japanese	3	7
Persians	.....	2
Australians	13	4
New Zealanders	6	3
Hindus	4	5
Hebrews	6	45
Greeks	2	20
Montenegrins	.....	2
Hawaiians	1	1
West Indies	3	1
South Americans	1	.....
Arabians	1	.....
Algerians	3	.....
South Africans	3	3
West Africans	.....	1
Spanish	.....	7
Brazilians	.....	1
Maltese	.....	1
Total	31,829	24,088

Number of souls represented by above entries: 74,246 in 1914.
" " " " 56,218 in 1915.

N. O. COTE,

Controller.

M.—STATEMENT showing the number of Homestead Entries made during the Fiscal Years ended March 31, 1914 and 1915, by persons coming from the various states and territories of the American Union.

States.	No. of Entries.	No. of Entries.	States.	No. of Entries.	No. of Entries.
	1914.	1915.		1914.	1915.
Alabama	11	6	Michigan	429	247
Alaska	2	1	Minnesota	1,159	740
Arkansas	10	21	Mississippi	2	2
California	67	46	Missouri	207	141
Carolina, North	32	15	Montana	136	70
Carolina, South	14	2	Nebraska	236	145
Colorado	36	24	Nevada	3	1
Columbia, District of	.....	.....	New Hampshire	18	16
Connecticut	17	13	New Jersey	13	11
Dakota, North	1,180	751	New Mexico	6	.....
Dakota, South	450	239	New York	227	134
Delaware	1	.....	Ohio	192	99
Florida	1	.....	Oklahoma	64	43
Georgia	5	2	Oregon	85	74
Idaho	45	42	Pennsylvania	133	87
Illinois	411	221	Rhode Island	17	15
Indiana	174	100	Tennessee	24	15
Indian Territory	.....	.....	Texas	47	39
Iowa	560	283	Utah	13	5
Kansas	173	133	Vermont	18	10
Kentucky	51	35	Virginia	41	16
Louisiana	10	7	Virginia, West	17	4
Maine	44	22	Washington	282	144
Maryland	19	7	Wisconsin	492	253
Massachusetts	103	44	Wyoming	16	9
				7,293	4,334

N. O. COTE,
Controller.

N.—STATEMENT showing the number of Homestead Entries made during the Fiscal Year 1914-15, the Nationality of the Homesteaders and the Provinces in which the entries were made.

Nationalities.	Provinces.				Total.
	Manitoba.	Saskatchewan.	Alberta.	British Columbia	
Canadians from Ontario	150	925	848	86	2,009
" Quebec	36	252	343	17	648
" Nova Scotia	11	70	97	18	196
" New Brunswick	7	29	65	16	117
" Prince Edward Island	3	14	40	3	60
" Manitoba	786	132	100	14	1,032
" Saskatchewan	14	313	51	5	383
" Alberta	3	17	406	8	434
" British Columbia	1	4	42	29	76
Persons who had previous entry	536	1,368	1,629	106	3,639
Newfoundlanders	.....	5	8	2	15
Canadians returned from the United States	11	9	27	1	48
Americans	279	1,714	2,181	112	4,286
English	614	1,067	1,129	164	2,974
Scotch	179	253	323	45	800
Irish	72	135	144	12	363
French	65	101	82	3	251
Belgians	39	44	26	.....	109
Swiss	14	25	40	4	83
Italians	2	24	65	17	108
Roumanians	.....	32	6	.....	38
Syrians	16	8	2	.....	16
Germans	52	134	274	14	474
Austro-Hungarians	1,056	850	943	30	2,879
Hollanders	15	31	56	2	104
Danes (other than Icelanders)	27	42	75	5	149
Icelanders	50	10	9	1	70
Swedes	90	175	319	44	628
Norwegians	46	319	262	17	645
Russians	207	658	451	16	1,332
Turks	.....	2	6	.....	8
Serbians	.....	2	2	.....	4
Bulgarians	.....	3	2	.....	5
Chinese	.....	1	2	.....	3
Japanese	.....	1	4	2	7
Persians	.....	2	.....	.....	2
Australians	1	2	1	.....	4
New Zealanders	1	1	.....	1	3
Hindoos	1	2	1	1	5
Spanish	2	.....	5	.....	7
Russian Jews	41	1	1	.....	43
Canadian Jews	.....	2	.....	.....	2
West Africans	1	.....	.....	.....	1
Greeks	2	9	4	5	20
South Africans	.....	1	1	1	3
Hawaians	.....	.....	1	.....	1
Montenegrins	.....	.....	2	.....	2
West Indies	.....	.....	1	.....	1
Maltese	.....	.....	.....	.....	1
Brazilians	.....	1	.....	1	1
Total	4,420	8,790	10,076	802	24,088

Number of souls represented by above entries: 56,218.

N. O. COTE,
Controller.

O.—STATEMENT showing the number of Homestead Entries made in the Provinces of Manitoba, Saskatchewan, Alberta and British Columbia during the Fiscal Year 1914-15 by persons coming from the United States of America.

States.	Provinces.				Total.
	Manitoba.	Saskatchewan.	Alberta.	British Columbia	
Alabama		1	5		6
Alaska				1	1
Arizona					
Arkansas		14	7		21
California		4	36	6	46
Carolina, North		3	11	1	15
Carolina, South		2			2
Colorado		9	13	2	24
Columbia, District of					
Connecticut		9	4		13
Dakota, North	144	289	315	3	751
Dakota, South	35	111	91	2	239
Delaware					
Florida					
Georgia		1	1		2
Idaho		11	29	2	42
Illinois	4	85	127	5	221
Indiana	4	43	50	3	100
Indian Territory					
Iowa		144	137	2	283
Kansas	2	37	90	4	133
Kentucky		10	24	1	35
Louisiana		4	3		7
Maine		8	14		22
Maryland		4	3		7
Massachusetts	1	19	23	1	44
Michigan	1	102	137	7	247
Minnesota	76	389	264	11	740
Mississippi			2		2
Missouri	1	38	92	10	141
Montana	1	9	57	3	70
Nebraska	2	56	84	3	145
Nevada			1		1
New Hampshire	2	7	7		16
New Jersey		5	6		11
New Mexico					
New York	2	45	83	4	134
Ohio		29	69	1	99
Oklahoma	4	9	30		43
Oregon	1	8	59	6	74
Pennsylvania		30	54	3	87
Rhode Island	2	6	7		15
Tennessee		4	11		15
Texas		14	24	1	39
Utah			5		5
Vermont	1	4	5		10
Virginia		7	7	2	16
Virginia, West		1	3		4
Washington		24	97	23	144
Wisconsin	7	124	117	5	253
Wyoming		4	4	1	9
Total	290	1,723	2,208	113	4,334

N. O. COTE,
Controller.

P.—STATEMENT showing the number of Homestead Entries reported in each year since 1874.

Departmental Year Ended—	Number of Entries.
Oct. 31, 1874	1,376
" 31, 1875	499
" 31, 1876	347
" 31, 1877	845
" 31, 1878	1,788
" 31, 1879	4,068
" 31, 1880	2,074
" 31, 1881	2,753
" 31, 1882	7,483
" 31, 1883	6,063
" 31, 1884	3,753
" 31, 1885	1,858
" 31, 1886	2,657
" 31, 1887	2,036
" 31, 1888	2,655
" 31, 1889	4,416
" 31, 1890	2,955
" 31, 1891	3,523
" 31, 1892	4,840
" 31, 1893	4,067
" 31, 1894	3,209
Dec. 31, 1895	2,394
" 31, 1896	1,857
" 31, 1897	2,384
" 31, 1898	4,848
" 31, 1899	6,689
June 30, 1900	7,426
" 30, 1901	8,167
" 30, 1902	14,673
" 30, 1903	31,383
" 30, 1904	26,073
" 30, 1905	30,819
" 30, 1906	41,869
Nine months ended March 31, 1907	21,647
Year ended March 31, 1908	30,424
" " 31, 1909	39,081
" " 31, 1910	41,568
" " 31, 1911	44,479
" " 31, 1912	39,151
" " 31, 1913	33,699
" " 31, 1914	31,829
" " 31, 1915	24,088

N. COTE,

Controller.

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Q.—STATEMENT showing the number of Pre-emptions, Purchased Homesteads granted in each Land Agency during the Fiscal Year 1914-15.

	Pre-emptions.	Purchased Homesteads.
Agency.		
Battleford	48	17
Brandon	.....	.....
Calgary	396	53
Dauphin	.....	.....
Edmonton	2	6
Estevan	1	1
Grande Prairie	.....	.....
Humboldt	.....	.....
Kamloops	.....	.....
Lethbridge	42	6
Maple Creek	632	48
Medicine Hat	211	23
Moosejaw	622	35
New Westminster	.....	.....
Peace River	.....	.....
Prince Albert	1	1
Regina	.....	.....
Red Deer	86	29
Revelstoke	.....	.....
Saskatoon	180	68
Swift Current	421	48
Weyburn	203	15
Winnipeg	.....	.....
Yorkton	.....	.....
Total	2,845	350

Provinces.		
Manitoba	.....	.....
Saskatchewan	2,108	233
Alberta	737	117
British Columbia	.....	.....
Total	2,845	350

N. O. COTE,
Controller.

R.—STATEMENT showing the number of Homesteads, Pre-emptions and Purchased Homesteads granted during each month from April 1, 1914, to March 31, 1915.

Month.	Homesteads.	Pre-emptions.	Purchased Homesteads.
1914.			
April	3,064	425	42
May	2,438	382	62
June	3,020	509	57
July	2,882	473	69
August	2,001	233	24
September	1,731	150	15
October	2,394	183	24
November	1,894	125	20
December	1,481	117	8
1915.			
January	901	74	9
February	868	72	8
March	1,414	102	12
Total	24,088	2,845	350

N. O. COTE,
Controller.

S.—STATEMENT showing the Half-Breed Scrip Locations during the Fiscal Year 1914-15.

——	No.	Acres.	
Manitoba—			
Winnipeg	2	160	
			160
Saskatchewan—			
Moosejaw	2	120	
Swift Current	1	120	
			240
Alberta—			
Peace River	7	800	
			800
Total of area granted	.....	.....	1,200

N. O. COTE,
Controller.

T.—Statement of Entries affecting Dominion Lands which were made at Head Office during the year ended March 31, 1915.

	No. of Grants.	Acres.
Special grants	272	16,895·79
Calgary and Edmonton Railway Company		25,589·48
Canadian Northern Railway Company		40,783·658
Canadian Pacific Railway Co. (main line)		159·
Qu'Appelle, Long Lake & Saskatchewan Railroad and Steamboat Company		35,521·69
Area granted to the Grand Trunk Pacific Railway for right of way purposes		343·02
Area granted to the Edmonton, Dunvegan and British Columbia Railway for right of way purposes		126·40
Railway, right of way	185	2,160·055
Hudson's Bay Company Grants	24	34·568

N. O. COTE,
Controller.

U.—Comparative Statement of the Homestead Entries and Sales made during the Fiscal Years ended March 31, 1914, and March 31, 1915, respectively.

	Fiscal Year ending March 31, 1914.		Fiscal Year ending March 31, 1915.	
	No. of entries.	Acres.	No. of entries.	Acres.
Homesteads	31,829	4,092,640	24,088	3,854,080
Sales	782	43,007	724	25,702

N. O. COTE,
Controller.

V.—Statement showing the number of Assignments recorded in the Land Patents Branch during the Fiscal Year ended March 31, 1915:—

Number of deeds registered	396
Fees received in connection therewith	$768·50

N. COTE,
Controller.

W.—Statement of Land Entries cancelled during the Fiscal Year 1914-15.

Year in which entry was made.	Manitoba.					Saskatchewan.										Alberta.										British Columbia					Grand Total.
	Homesteads.		Pre-emptions.		Sales.	Homesteads.		Pre-emptions.		Purchased Homesteads.			Sales.		Total.	Homesteads.		Pre-emptions.		Purchased Homesteads.			Sales.		Total.	Homesteads.		Sales.		Total.	
	Cause of Cancellation.					Cause of Cancellation.										Cause of Cancellation.										Cause of Cancellation.					
	Abandonment.	Default.	Error, etc.	Default.	Total.	Abandonment.	Default.	Error, etc.	Abandonment.	Default.	Error, etc.	Abandonment.	Default.	Error, etc.	Abandonment.	Default.		Abandonment.	Default.	Error, etc.	Abandonment.	Default.	Error, etc.	Abandonment.	Default.		Abandonment.	Default.	Default.	Error, etc.		
1915	3		1		4	12		1	2						15	12		2							14	3				3	36
1914	332	42	2		376	953	142	18	171	5	13	16		1	1319	1246	339	20	73	50	2	5		1		1736	62	20			82	3513
1913	291	207	5		503	1182	768	10	363	220	6	20			2569	1723	892	2	156	161		16			1	2451	105	149			254	5777
1912	142	189	1		332	417	598		149	176		15	6		1361	354	581		68	106	1	12	1			1123	19	25			44	2860
1911	85	97			182	130	284		54	74		5	4		551	134	227		41	32	1	8	1		1	445	8	15			23	1201
1910	25	48			73	67	159		57	101					384	47	141		57	90		2	1		1	339	1	11			12	808
1909	30	40			70	21	61		21	57		1	1	1	163	18	59		21	47			2			147	2	4			6	386
1908	20	35			55	7	30	1	12	33			1		84	17	31		11	20						79	2	4			6	224
1907	10	21		1	32	2	22		3				2		29	3	25									28	2	3	1		6	95
1906	5	14		1	20	8	31								39	5	28							2		35						94
1905	4	16			20	4	7								11	2	10									12						43
1904	1	9			10	1	6								8		7									7						25
1903	5	6			11		4							1	4		4									4						19
1902		3			3	1	1								2		3									3						8
1901						1	2								3																3
1900		1			1		2								2																3
1899		1			1																										1
1898	1				1																										1
1897																															
1896																															
1895																															
1894																															
1893																															
1892		1			1																										
1891																															1
1890		1			1																										
1889																															1
1888																															
Totals	954	731	9	2	1696	2806	2117	30	832	666	19	57	14	2	1	6544	3061	2347	24	427	506	4	43	5	1	2	3	6423	204	231	1		436	15099

N. O. COTE, *Controller.*

No. 34.

REPORT OF THE ORDNANCE AND ADMIRALTY LANDS BRANCH.

OTTAWA, June 14, 1915.

SIR,—I have the honour to submit the following report on the work carried on in connection with this branch of the department during the fiscal year ending March 31, 1915.

Within the period covered by this report there were no public sales of Ordnance land held, but, with respect to lands previously sold or occupied under leases with the option of purchase one whole lot, two half lots and one part lot situated in the different localities hereunder mentioned, and in the accompanying statement lettered "A" have been paid in full and letters patent issued.

Grand Falls.—One town lot forming part of the Ordnance reserve in this locality which was disposed of at a sale by public auction held at Grand Falls on the 6th May, 1908, for the sum of $75 was paid in full, and letters patent issued. The sum of $39, the balance of the purchase price, was received during the year.

Ottawa.—In accordance with the provisions contained in the original leases granted by the Imperial authorities to the tenants of Ordnance lands in this locality, two half lots and one part lot have been redeemed and letters patent issued therefor. The total amount of consideration money received for these lots was $197.50.

Green Island.—This island is situated at the mouth of the Rideau river at its confluence with the Ottawa river, and was originally acquired by the principal officers of Her Majesty's Ordnance in connection with the construction of the Rideau canal. The island in question has been held under lease, in perpetuity, since 1836. Application having been made on behalf of the executors of the estate of the late James MacLaren for a grant from the Crown covering a small portion of this island, in order to close out the estate, the same was favourably considered and the authority of Council obtained for the sale to the executors of the said estate of the portion of the island applied for, for the sum of $1,000, which was paid in full and letters patent issued.

The following statements are hereto annexed:—

A.—Statement showing the number of lots and part lots sold or redeemed, the consideration or purchase price of such lots and the sums received during the year as balance of purchase money or consideration in full.

B.—Statement giving the names of the various localities where Ordnance lands are situated on account of which moneys have been received during the fiscal year.

C.—Statement showing the receipts each month of the fiscal year classified as fees, rent, or interest equivalent to rent and principal.

D.—Statement showing the amounts due and unpaid on account of purchase money and rent or interest. The total amount shown to be outstanding is $5,995.

The number of letters received, recorded and filed was 328; the number of letters sent out, 557 and, in addition, eighty-one reports on various subjects pertaining to this branch were prepared and submitted. There were ninety-nine receipts issued, 130 accounts prepared and rendered, five draft letters patent prepared, issued and recorded, one lease issued, and three assignments registered. The accounts open in the books of this branch were carefully and regularly posted, the receipt book, cash book, and monthly statement book have been diligently kept, and a monthly return of all moneys received regularly prepared and forwarded to the superintending accountant.

In addition to the foregoing report appertaining to Ordnance and Admiralty lands the work in connection with the Orders in Council relating to this department passed during the year was promptly, carefully and efficientaly carried on. Within the year there were 786 orders in council passed; these were all recorded, copied, compared, printed, checked, numbered, and filed for future reference and requirements. Of the above mentioned number of orders in council passed, 196 were covered by requisitions for publication in *The Canada Gazette,* and twenty-three likewise in the *British Columbia Gazette,* in accordance with the various acts and regulations governing the administration, sale and management of Dominion Lands.

During the year another bound volume of orders in council was completed and distributed among the numerous branches of the department, and indices for two additional volumes prepared for printing.

A conception may be formed of the volume and importance of the work performed in this branch in connection with the keeping of the record of attendance of the numerous officials in the sundry branches of this department, when attention is drawn to the fact that this record embraces absences for any and all causes and forms the basis for the monthly pay-list, as well as for the preparation of the quarterly report furnished in compliance with the provisions of the Civil Service Amendment Act, 1908.

I have the honour to be, sir,

Your obedient servant,

JOS. P. DUNNE,
Superintendent.

A.—STATEMENT giving the number of lots and part lots sold or redeemed, the amount for which such lots were originally disposed of and the sum received as instalment or balance of purchase money during the Fiscal Year ending March 31, 1915.

Locality.	Number of lots sold or redeemed.	Amount of consideration of purchase money.	Amt. received on account during Fiscal Year.	Remarks.
		$ cts.	$ cts.	
Ottawa	2 ½ lots	165 00	165 00	Purchase money in full.
	1 pt. lot	32 50	32 50	" "
Pt. Green Island		1,000 00	1,000 00	" "
Grand Falls	1 town lot	75 00	39 00	Balance purchase money
		1,272 50	1,236 50	

JOS. P. DUNNE,
Superintendent,
Ordnance and Admiralty Lands.

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B.—STATEMENT naming the various localities where Ordnance Lands are situated on account of which moneys have been received during the Fiscal Year ending March 31, 1915.

Locality.	Total.
Amherstburg	2 00
Beaver Harbour	20 00
Burlington	100 00
Edmundston	1 00
Elmsley	9 70
Fort Cumberland	145 00
Fort Erie	2 00
Grand Falls	212 40
Kingston	348 25
Montague	3 00
Nepean	5 00
Oromocto	50
Ottawa	2,262 10
Owen Sound	83 50
Oxford	1 20
Point Edward	200 00
Port Maitland	10 00
Point Pelee	87 95
Prescott	1 00
Quebec	830 00
Queenston	2 00
St. Joseph's Island	4 00
Shelbourne	3 00
Sorel	37 04
South Crosby	2 00
	$4,373 64
Fees	43 00
	$4,416 64
Less refund	4 50
	$4,412 14

JOS. P. DUNNE,

Superintendent,

Ordnance and Admiralty Lands.

C.—STATEMENT showing receipts each month of the year classified as fees, rent or interest equivalent to rent and principal.

Month.	Fees.	Interest.	Principal.	Total.
	$ cts.	$ cts.	$ cts.	$ cts.
April	13 00	148 30	.....	161 30
May	8 00	358 97	1,132 50	1,499 47
June	.....	1 75	.....	1 75
July	2 00	991 90	78 40	1,072 30
August	2 00	46 63	0 20	48 83
September	.....	58 22	.....	58 22
October	.....	417 50	.....	417 50
November	8 00	66 24	.....	74 24
December	.....	150 00	105 00	255 00
January	.....	421 10	.....	421 10
February	4 50	165 13	65 00	234 63
March	5 50	166 80	.....	172 30
	43 00	2,992 54	1,381 10	4,416 64
Less Refunds	.....	.....	.....	4 50
				4,412 14

JOS. P. DUNNE,
Superintendent,
Ordnance and Admiralty Lands.

D.—STATEMENT showing amounts due and unpaid on account of purchase money and rent or interest for the year ending March 31, 1915.

Locality.	Rent or Interest.	Principal.	Total.
	$ cts.	$ cts.	$ cts.
Burlington Beach	360 00	.....	360 00
Chambly	300 96	152 00	452 96
Carillon	6 40	.....	6 40
Dalhousie	19 32	[illegible] 00	42 32
Elmsley	0 50	.....	0 50
Grand Falls	205 62	[illegible] 18	712 80
Grenville	2 20		2 20
Kingston	200 00		200 00
Marlborough	7 00	"	7 00
Nepean	66 00	purcha	66 00
Niagara	126 55		
Ottawa	2,476 55	.....	2,476 55
Oxford	18 50	.....	18 50
Owen Sound	67 50	.....	67 50
Point Pelee	1 00	.....	1 00
Prescott	1 00	.....	1 00
Presqu Isle	2 50	.....	2 50
St. Croix River	8 00	.....	8 00
St. Joseph's Island	386 42	.....	386 42
Sorel	30 00	.....	30 00
Tay	24 00	.....	24 00
Wolford	495 80	.....	495 80
	4,805 82	1,189 18	5,995 00

JOS. P. DUNNE,
Superintendent,
Ordnance and Admiralty Lands.

No. 35.

REPORT OF THE CORRESPONDENCE REGISTRATION BRANCH.

Ottawa, April 25, 1915.

W. W. Cory, Esq., C.M.G.,
Deputy Minister of the Interior,
Ottawa.

Sir,—I have the honour to place before you a report of the work of the Correspondence Registration Branch of the department for the Fiscal Year which ended with March 31 last.

Statement "A" shows the number of letters recorded and the amount of money received and sent to the accountant during the year.

Statement "B" shows the growth of the work year by year for the past sixteen years.

Letters or parcels inclosing cash, cheques, money orders, etc., reached a total of 6,766.

There were 2,352 telegrams received and registered.

Letters written in French, German, Ruthenian, Polish, Russian, Hungarian, Swedish, Norwegian, Danish, Finnish, Dutch, Greek, Bohemian, Chinese, Roumanian, and translated into English, numbered 2,555.

There were upwards of a million files distributed to the several branches, and at present there are 5,500 files being acted on or awaiting action throughout the department.

A total of 295,491 letters was received and dealt with and 221,624 were numbered and recorded.

A courteous and efficient clerk, Miss J. D. Dewar, died in June of this year, and four (4) permanent clerks were transferred to other branches, namely, A. Paquette, J. F. Gillespie, J. McCadden, and A. Bourbeau.

The following members of the staff are away on military service: J. A. Cadieux, Alex. McCracken, Alex. McCullough, and J. B. F. Racette.

Fourteen clerks were temporarily employed for varying periods. At present there are but four clerks temporarily employed.

I have the honour to be, sir,

Your obedient servant,

J. M. ROBERTS.

A.—STATEMENT showing the number of Letters recorded and the Money received during the Fiscal Year ended March 31, 1915.

1914.	Letters Recorded.	Daily Average.	Registered Letters.		Money Received.
			Received.	Sent.	
April	21,022	876	2,262	2,670	$ 47,623 00
May	16,898	704	2,201	2,401	82,291 19
June	19,499	780	2,776	2,385	102,014 21
July	20,589	792	2,689	2,396	51,554 17
August	17,398	696	2,550	2,335	26,773 01
September	15,978	666	2,264	2,723	93,746 70
October	14,759	568	2,535	2,573	187,251 58
November	18,984	833	2,442	2,428	107,722 26
December	19,216	801	2,355	2,042	65,504 08
1915.					
January	20,163	840	2,283	2,254	66,774 72
February	19,036	828	2,299	1,602	32,628 37
March	18,082	670	2,578	2,450	30,210 17
Total	221,624		29,234	28,259	$894,093 46

J. M. ROBERTS,
Chief of Branch.

B.—STATEMENT showing the number of Letters recorded and Money received during each fiscal year from 1900 to March 31, 1915.

Fiscal Year.	Letters Recorded.	Money Received.
		$ cts.
1900	48,663	200,831 71
1901	67,860	333,534 02
1902	67,722	382,999 87
1903	87,851	629,585 47
1904	113,074	630,355 44
1905	135,908	528,219 76
1906	176,729	875,933 54
1907 (nine months)	150,462	1,337,780 94
1908	187,684	1,558,230 32
1909	260,142	1,798,276 17
1910	264,209	2,381,605 39
1911	279,186	2,220,117 97
1912	272,419	2,377,102 66
1913	255,105	2,456,168 27
1914	238,463	2,243,074 13
1915	221,624	894,093 46

J. M. ROBERTS,
Chief of Branch.

No 36.

REPORT OF THE CORRESPONDENCE COMPARING AND MAILING BRANCH.

OTTAWA, April 15, 1915.

W. W. CORY, Esq., C.M.G.,
Deputy Minister,
Department of the Interior,

SIR,—I have the honour to submit to you, herewith, a report showing the work done in the Correspondence, Comparing and Mailing Branch of the Department of the Interior during the Fiscal Year ended March 31, 1915.

I have the honour to be, sir,

Your obedient servant,

CHAS. C. PELLETIER,
Clerk in Charge.

STATEMENT of the work done in the Correspondence Comparing and Mailing Branch during the Fiscal Year ended March 31, 1915.

From April 1, 1914, to March 31, 1915.	Letters sent.	Registered letters sent.	Telegrams sent.	Totals.
1914.				
April	31,315	2,670	245	34,230
May	28,800	2,401	290	31,491
June	30,242	2,385	291	32,918
July	27,067	2,396	304	29,767
August	28,433	2,335	155	30,923
September	31,613	2,723	123	34,459
October	28,995	2,573	162	31,730
November	28,138	2,428	161	30,727
December	28,280	2,042	133	30,455
1915.				
January	28,710	2,254	146	31,110
February	26,550	1,602	205	28,357
March	38,785	2,450	237	41,472
Total for fiscal year ending March 31, 1915	356,928	28,259	2,452	387,639

The outgoing letters were copied in 161 one-thousand paged letter-books.

The number of pages of letter-books indexes was 153,974.

The daily average of letters sent out was 1,208.

The heaviest average was during the month of March, 1915, the daily average being 1,383. The lightest month was October, 1914, with an average of 1,115.

There were 1,800 documents compared.

The grand total of outgoing correspondence from this office during the Fiscal Year 1915 was 387,639.

There were fifty-five circulars sent out to the Dominion Lands agents and sub-agents.

CHAS. C. PELLETIER,

Clerk in Charge,

Correspondence, Comparing and Mailing Branch.

No. 37.

REPORT OF THE SURVEY RECORDS BRANCH.

OTTAWA, June 30, 1915.

W. W. CORY, Esq..
Deputy Minister of the Interior,
Ottawa.

SIR,—I have the honour to submit herewith a statement of work performed in the Survey Records Branch, during the year ending March 31, 1915.

C. J. STEERS.

STATEMENT of work performed in the Survey Records Branch, during the year ending March 31, 1915.

Files received and dealt with	23,645
Letters drafted	6,895
Plans, tracings ,etc., compiled and copied	283
Original township plans copied	135
Plans copied for timber berths, etc	1,342
Plans sent agents, registrars, etc	24,956
Plans sent in answer to special requests	22,105
Pages of field notes copied	1,244
Prints of plans received and stored	241,597
Original plans received and recorded	1,422
Letters to agents, registrars, etc	1,482
Registered parcels mailed	2,049
Field notes received and recorded	808
Work performed for the Topographical Survey Branch—	
Books searched for	7,521
Books sent	5,879
Books returned	5,016
Plans searched for	5,186
Plans sent	3,897
Plans returned	1,681
Volumes searched for	182
Volumes sent	103
Volumes returned	93
Work performed for Patents Branch—	
Plans searched for	895
Plans sent	895
Plans returned	326
Books searched for	94
Books sent	88
Books returned	85
Work performed for other Branches—	
Plans searched for	743
Plans sent	702
Plans returned	498
Books searched for	289
Books sent	277
Books returned	287

PART II

IMMIGRATION

REPORT OF THE SUPERINTENDENT OF IMMIGRATION.

OTTAWA, July 2, 1915.

W. W. CORY, Esq., C.M.G.,
Deputy Minister of the Interior,
Ottawa.

SIR,—I have the honour to forward to you herewith the usual reports on immigration for the fiscal year ended March 31, 1915.

SUMMARY for the Fiscal Year 1914-15.

Per ocean travel:—			
Quebec		49,431	
Halifax		13,847	
St. John		5,042	
Vancouver		1,157	
Victoria		1,046	
North Sydney		447	
New York	10,207		
Portland	2,411		
Boston	1,286		
Philadelphia	87		
Baltimore	49		
		14,040	85,010
From United States			59,779
Total			144,789

COMPARATIVE STATEMENT.—IMMIGRATION TO CANADA, via ocean ports, by months, for the Fiscal Year 1914-15, compared with that of the Fiscal Year 1913-14.

	1913-14.				1914-15.			
	Males.	Females.	Children.	Totals.	Males.	Females.	Children.	Totals.
April	39,152	9,079	5,794	54,025	15,754	4,865	3,067	23,686
May	38,672	12,162	8,057	58,891	13,846	5,828	4,080	23,754
June	31,582	12,114	8,596	52,292	6,566	4,819	3,046	14,431
July	17,995	8,065	5,598	31,658	3,148	3,337	2,345	8,830
August	9,772	7,384	4,984	22,140	1,482	1,982	1,264	4,728
September	5,659	5,797	3,867	15,323	664	1,448	844	2,956
October	4,626	4,933	3,624	13,183	410	981	568	1,959
November	2,561	2,588	1,895	7,044	304	811	527	1,642
December	2,177	1,898	1,318	5,393	196	437	253	886
January	1,230	738	504	2,472	84	177	101	362
February	1,413	1,073	654	3,140	187	301	104	592
March	7,094	2,939	1,754	11,787	364	444	376	1,184
Totals	161,933	68,770	46,645	277,348	43,005	25,430	16,575	85,010

COMPARATIVE STATEMENT.—IMMIGRATION FROM THE UNITED STATES to Canada, by months, for the Fiscal Year 1914-15, compared with that of the Fiscal Year 1913-14.

	1913-14.				1914-15.			
	Males.	Females.	Children.	Totals.	Males.	Females.	Children.	Totals.
April	11,848	3,868	3,544	19,260	6,524	2,696	2,528	11,748
May	8,383	3,252	2,612	14,247	4,631	2,383	1,951	8,965
June	6,641	2,872	1,978	11,491	3,669	2,383	1,521	7,573
July	5,035	2,401	1,606	9,042	3,233	2,063	1,348	6,644
August	6,117	2,052	1,512	9,681	3,036	1,372	964	5,372
September	5,773	1,907	1,479	9,159	1,735	947	648	3,330
October	3,971	1,971	1,508	7,450	1,679	1,011	718	3,408
November	3,075	1,547	1,320	5,942	1,280	835	464	2,579
December	2,237	1,223	808	4,268	998	657	395	2,050
January	1,797	974	627	3,398	1,057	549	281	1,887
February	1,820	933	715	3,468	1,016	588	371	1,975
March	5,718	2,258	2,148	10,124	2,280	1,076	892	4,248
Totals	62,415	25,258	19,857	107,530	31,138	16,560	12,081	59,779

COMPARATIVE STATEMENT.—TOTAL IMMIGRATION, for Canada, by months, for the Fiscal Year 1914-15, compared with that of the Fiscal Year 1913-14.

	1913-14.				1914-15.			
	Males.	Females.	Children.	Totals.	Males.	Females.	Children.	Totals.
April	51,000	12,947	9,338	73,285	22,278	7,561	5,595	35,434
May	47,055	15,414	10,669	73,138	18,477	8,211	6,031	32,719
June	38,223	14,986	10,574	63,783	10,235	7,202	4,567	22,004
July	23,030	10,466	7,204	40,700	6,381	5,400	3,693	15,474
August	15,889	9,436	6,496	31,821	4,518	3,354	2,228	10,100
September	11,432	7,704	5,346	24,482	2,399	2,395	1,492	6,286
October	8,597	6,904	5,132	20,633	2,089	1,992	1,286	5,367
November	5,636	4,135	3,215	12,986	1,584	1,646	991	4,221
December	4,414	3,121	2,126	9,661	1,194	1,094	648	2,936
January	3,027	1,712	1,131	5,870	1,141	726	382	2,249
February	3,233	2,006	1,369	6,608	1,203	889	475	2,567
March	12,812	5,197	3,902	21,911	2,644	1,520	1,268	5,432
Totals	224,348	94,028	66,502	384,878	74,143	41,990	28,656	144,789

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COMPARATIVE STATEMENT.—TOTAL IMMIGRATION, for Canada, by ports for the Fiscal Year 1914-15, compared with that of the Fiscal Year 1913-14.

	1913-14.				1914-15.			
	Males.	Females.	Children.	Totals.	Males.	Females.	Children.	Totals.
Quebec	79,274	46,766	31,896	157,936	20,582	17,425	11,424	49,431
Halifax	35,518	10,121	7,155	52,794	8,343	3,203	2,301	13,847
St. John	9,291	3,942	2,386	15,619	2,520	1,504	1,018	5,042
Vancouver	2,430	249	201	2,880	977	108	72	1,157
Victoria	3,879	466	155	4,500	589	382	75	1,046
North Sydney	388	152	125	665	331	71	45	447
United States ports (New York, Portland, Boston, Philadelphia and Baltimore)	31,153	7,074	4,727	42,954	9,663	2,737	1,640	14,040
From the United States	62,415	25,258	19,857	107,530	31,138	16,560	12,081	59,779
Totals	224.348	94,028	66,502	384,878	74,143	41,990	28,656	144,789

Sex, Occupation and Destination of total Immigrant arrivals

—	Sex.				Trade or								
					Farmers and Farm Labourers Class.			General Labourers.			Mechanics.		
	Males.	Females.	Children.	Totals.	Males.	Females.	Children.	Males.	Females.	Children.	Males.	Females.	Children.
Via ocean ports	43,005	25,430	16,575	85,010	10,742	3,499	4,172	22,493	3,380	3,239	4,684	4,169	3,664
From the United States....	31,138	16,560	12,081	59,779	12,780	4,321	4,718	5,913	1,850	1,515	8,061	2,604	1,873
Totals.....	74,143	41,990	28,656	144,789	23,522	7,820	8,890	28,406	5,230	4,754	12,745	6,773	5,537

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for Canada, for the Fiscal Year ended March 31, 1915.

Occupation.										Destination.							
Clerks, Traders etc.			Miners.			Female Servants.	Not Classified.			Maritime Provinces.	Quebec.	Ontario.	Manitoba.	Saskatchewan.	Alberta.	British Columbia.	Yukon Territory.
Males.	Females.	Children.	Males.	Females.	Children.		Males.	Females.	Children.								
1,986	1401	788	761	292	409	8,239	2,339	4,450	4,303	4,011	18,718	32,875	9,429	6,918	6,506	6,549	4
1,394	693	294	504	62	52	2,371	2,486	4,659	3,629	7,093	12,335	11,998	3,767	9,255	11,757	3,574	
3,380	2,094	1,082	1,265	354	461	10,610	4,825	9,109	7,932	11,104	31,053	44,873	13,196	16,173	18,263	10,123	4

COMPARATIVE STATEMENT.—TOTAL IMMIGRATION to Canada, by Nationalities, for the Fiscal Year 1914-15, compared with that of the Fiscal Year 1913-14, showing increase or decrease of each Nationality.

——	1913-14.	1914-15.	Increase.	Decrease.
English	102,122	30,807	.....	71,315
Irish	9,585	3,525	.....	6,060
Scotch	29,128	8,346	.....	20,782
Welsh	1,787	598	.....	1,189
Total British	142,622	43,276	.....	99,346
African, South	56	23	.....	33
Albanian	3	4	1	.....
Argentinian	2	5	3	.....
Australian	106	51	.....	55
Austro-Hungarian—				
Austrian, N.E.S.	3,147	502	.....	2,645
Bohemian	270	94	.....	176
Bukowinian	1,549	72	.....	1,477
Croatian	803	1 4	.....	639
Dalmatian	182	24	.....	158
Galician	1,698	36	.....	1,662
Hungarian, N.E.S.	833	218	.....	615
Magyar	1,301	176	.....	1,125
Ruthenian	18,372	5,830	.....	12,542
Slovak	166	34	.....	132
Styrian	2	.....	.....	2
Belgian	2,651	1,149	.....	1,502
Bermudian	56	4	.....	52
Brazilian	5	.....	.....	5
Bulgarian	1,727	4,048	2,321	.....
Chinese	5,512	1,258	.....	4,254
Cuban	10	1	.....	9
Dutch	1,506	605	.....	901
French	2,683	1,206	.....	1,477
German—				
German, N.E.S.	5,525	2,470	.....	3,055
Bavarian	4	2	.....	2
Prussian	8	.....	.....	8
Greek	1,102	1,147	45	.....
Hawaiian	2	18	16	.....
Hebrew—				
Hebrew, N.E.S.	860	266	.....	594
" Austrian	728	160	.....	568
" German	20	1	.....	19
" Polish	22	6	.....	16
" Russian	9,622	2,674	.....	6,948
Hindoo	88	.....	.....	88
Italian	24,722	6,228	.....	18,494
Jamaican	189	29	.....	160
Japanese	856	592	.....	264
Macedonian	17	132	115	.....
Maltese	402	19	.....	383
Mexican	9	.....	.....	9
Montenegrin	13	9	.....	4
Negro	266	202	.....	64
Newfoundland	496	338	.....	158
New Zealand	24	21	.....	3
Persian	19	7	.....	12
Polish—				
Polish, N.E.S.	930	153	.....	777
" Austrian	4,310	1,272	.....	3,038
" German	46	7	.....	39
" Russian	4,507	544	.....	3,963
Portuguese	58	8	.....	50
Roumanian	1,504	361	.....	1,143
Russian—				
Russian, N.E.S.	24,485	5,201	.....	19,284
Doukhobor	4	.....	.....	4
Finnish	3,183	459	.....	2,724

TOTAL IMMIGRATION, by Nationalities, etc.—*Concluded.*

	1913-14.	1914-15.	Increase.	Decrease.
Scandinavian—				
Danish	871	326	.....	545
Icelandic	292	145	.....	147
Norwegian	1,647	788	.....	859
Swedish	2,435	916	.....	1,519
Serbian	193	220	27	.....
Spanish	1,138	755	.....	383
Swiss	269	209	.....	60
Turkish—				
Turkish, N.E.S.	187	33	.....	154
Arabian	16	.....	.....	16
Armenian	139	36	.....	103
Egyptian	5	.....	.....	5
Syrian	278	79	.....	199
U.S.A. Citizens, via ocean ports	121	41	.....	80
West Indian	474	356	.....	118
Total Continental, etc	134,726	41,734	.....	92,992
From the United States	107,530	59,779	.....	47,751
Total immigration	384,878	144,789	.....	240,089

ARRIVALS AT OCEAN PORTS.

For the Fiscal Year 1914-15, there arrived via Canadian and United States ocean ports 177,303 passengers, of whom 18,221 travelled saloon, and 159,082 steerage. Of the saloon passengers, 13,678 were destined to Canada, and 4,543 to the United States. Of the steerage passengers, 138,852 were for Canada, and 20,230 for the United States. Included in the steerage passengers for Canada were 45,735 returned Canadians and 8,107 tourists, leaving the immigration proper at 85,010 souls, which together with the 59,779 settlers from the United States, brings the total immigration to 144,789, a decrease as compared with the preceding fiscal year of 240,089 persons.

The following further statistical information will be of interest: Table I deals with the total arrivals of saloon passengers; Table II with the total arrivals of steerage passengers; Table III with the monthly arrivals of immigrants for Canada; and Tables IV and V give summaries of the information obtained from immigrants for Canada upon arrival.

TABLE I.—Nationality and Sex of Saloon Passengers arriving at Ocean Ports for the Fiscal Year ended March 31, 1915.

—	CANADA.				UNITED STATES.				CANADA AND UNITED STATES.			
	Males.	Females.	Children.	Totals.	Males.	Females.	Children.	Totals.	Males.	Females.	Children.	Totals.
African, South	3	2	3	8					3	2	3	8
Australian	8	7	1	16	3	4		7	11	11	1	23
Austro-Hungarian—												
Austrian, N.E.S.	2	1		3	5	4		9	7	5		12
Croatian						1		1		1		1
Hungarian, N.E.S.	2			2	1			1	3			3
Magyar		1		1						1		1
Belgian	3	5	1	9					3	5	1	9
Bermudian	1			1					1			1
Chilian		1		1						1		1
Chinese	1	1	1	3					1	1	1	3
Cuban	1			1	1	1		2	2	1		3
Dutch	7	3	3	13	5	8	4	17	12	11	7	30
French	27	13	2	42	7	25	3	35	34	38	5	77
German	13	16	5	34	20	17	2	39	33	33	7	73
Gt. Britain and Ireland:												
English	163	188	67	418	207	134	27	368	370	322	94	786
Irish	31	15	1	47	22	17		39	53	32	1	86
Scotch	49	42	7	98	46	28	3	77	95	70	10	175
Welsh	8	2		10	4	1		5	12	3		15
Greek	6	1		7		1		1	6	2		8
Hebrew, Russian	1	4	1	6	1	3		4	2	7	1	10
Italian	14	3		17		2	1	3	14	5	1	20
Jamaican	1	1		2					1	1		2
Japanese	7	8	1	16	5	5	2	12	12	13	3	28
Mexican					3	4	4	11	3	4	4	11
Negro	1	1		2					1	1		2
Newfoundland	72	45	19	136	144	175	41	360	216	220	60	496
New Zealand					2	1		3	2	1		3
Polish					1			1	1			1
Russian—												
Russian, N.E.S.	7	2		9	14	4		18	21	6		27
Finnish					1			1	1			1
Scandinavian—												
Danish	4	3		7	1	1	2	4	5	4	2	11
Icelandic					3			3	3			3
Norwegian	5	4	1	10	3	3		6	8	7	1	16
Swedish	3	2		5	4	1		5	7	3		10
Spanish	1	1		2	1			1	2	1		3
Swiss		1		1	4	6	1	11	4	7	1	12
Turkish—												
Turkish, N.E.S.	3			3					3			3
Syrian	1			1	4			4	5			5
U.S.A. Citizens	35	19		54	1,393	1,684	230	3,307	1,428	1,703	230	3,361
Venezuelan						1		1		1		1
West Indian	13	13	3	29					13	13	3	29
Returned Canadian	4,150	3,128	641	7,919					4,150	3,128	641	7,919
Tourist	2,733	1,719	293	4,745	93	85	9	187	2,826	1,804	302	4,932
Totals	7,376	5,252	1,050	13,678	1,998	2,216	329	4,543	9,374	7,468	1,379	18,221

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TABLE II.—Nationality and Sex of Steerage Passengers arriving at Ocean Ports for the Fiscal Year ended March 31, 1915.

	Canada.				United States.				Canada and United States.			
	Males.	Females.	Children.	Totals.	Males.	Females.	Children.	Totals.	Males.	Females.	Children.	Totals.
African, South	13	5	5	23	3	1	6	10	16	6	11	33
Albanian	.....	2	2	4	12	.....	.....	12	12	2	2	16
Argentinian	2	1	2	5	.....	1	.....	1	2	2	2	6
Australian	25	18	8	51	29	21	6	56	54	39	14	107
Austro-Hungarian—												
Austrian, N.E.S.	271	136	95	502	66	72	42	180	337	208	137	682
Bohemian	48	25	21	94	6	5	3	14	54	30	24	108
Bukowinian	41	18	13	72	.....	.....	.....	.....	41	18	13	72
Croatian	100	34	30	164	8	1	2	11	108	35	32	175
Dalmatian	21	1	2	24	1	.....	.....	1	22	1	2	25
Galician	25	7	4	36	.....	3	5	8	25	10	9	44
Hungarian, N.E.S.	129	54	35	218	47	55	31	133	176	109	66	351
Magyar	110	33	33	176	12	12	9	33	122	45	42	209
Ruthenian	3,700	1,230	900	5,830	3	3	.....	6	3,703	1,233	900	5,836
Slovak	24	5	5	34	1	.....	.....	1	25	5	5	35
Belgian	581	316	252	1,149	64	29	18	111	645	345	270	1,260
Bermudian	1	2	1	4	.....	.....	.....	.....	1	2	1	4
Bulgarian	4,012	18	18	4,048	70	4	5	79	4,082	22	23	4,127
Chinese	1,147	40	71	1,258	110	3	1	114	1,257	43	72	1,372
Cuban	1	.....	.....	1	.....	.....	.....	.....	1	.....	.....	1
Dutch	288	159	158	605	79	38	29	146	367	197	187	751
French	644	362	200	1,206	35	22	14	71	679	384	214	1,277
German—												
German, N.E.S.	1,196	616	658	2,470	185	178	75	438	1,381	794	733	2,908
Bavarian	1	1	.....	2	.....	.....	.....	.....	1	1	.....	2
Great Britain and Ireland												
English	10,047	12,471	8,289	30,807	1,369	1,217	615	3,201	11,416	13,688	8,904	34,008
Irish	1,441	1,469	615	3,525	140	119	51	310	1,581	1,588	666	3,835
Scotch	2,439	3,834	2,073	8,346	463	492	265	1,220	2,902	4,326	2,338	9,566
Welsh	239	226	133	598	49	33	35	117	288	259	168	715
Greek	1,015	87	45	1,147	29	.....	.....	29	1,044	87	45	1,176
Hawaiian	16	1	1	18	.....	1	.....	1	16	2	1	19
Hebrew—												
Hebrew, N.E.S.	113	70	83	266	12	9	12	33	125	79	95	299
" Austrian	53	65	42	160	5	3	7	15	58	68	49	175
" German	1	.....	.....	1	2	.....	.....	2	3	.....	.....	3
" Polish	3	2	1	6	.....	.....	.....	.....	3	2	1	6
" Russian	917	898	859	2,674	425	487	474	1,386	1,342	1,385	1,333	4,060
Italian	5,191	646	391	6,228	70	9	9	88	5,261	655	400	6,316
Jamaican	6	20	3	29	.....	.....	.....	.....	6	20	3	29
Japanese	191	358	43	592	69	15	3	87	260	373	46	679
Macedonian	131	1	.....	132	.....	.....	.....	.....	131	1	.....	132
Maltese	15	4	.....	19	1	.....	.....	1	16	4	.....	20
Mexican	.....	.....	.....	.....	1	.....	.....	1	1	.....	.....	1
Montenegrin	7	1	1	9	.....	.....	.....	.....	7	1	1	9
Negro	131	64	7	202	9	2	.....	11	140	66	7	213
Newfoundland	191	89	58	338	617	482	159	1,258	808	571	217	1,596
New Zealand	13	6	2	21	8	5	2	15	21	11	4	36
Persian	5	.....	2	7	19	.....	.....	19	24	.....	2	26
Polish—												
Polish, N.E.S.	87	37	29	153	12	8	6	26	99	45	35	179
" Austrian	656	351	265	1,272	15	25	18	58	671	376	283	1,330
" German	7	.....	.....	7	8	4	4	16	15	4	4	23
" Russian	319	125	100	544	97	71	34	202	416	196	134	746
Portuguese	7	1	.....	8	2	.....	.....	2	9	1	.....	10
Roumanian	259	55	47	361	11	5	1	17	270	60	48	378
Russian—												
Russian, N.E.S.	4,149	553	499	5,201	1,007	423	367	1,797	5,156	976	866	6,998
Finnish	262	132	65	459	460	274	154	888	722	406	219	1,347

TABLE II.—Nationality and Sex of Steerage Passengers arriving at Ocean Ports for the Fiscal Year ended March 31, 1915.—*Concluded.*

	CANADA.				UNITED STATES.				CANADA AND UNITED STATES.			
	Males.	Females.	Children.	Totals.	Males.	Females.	Children.	Totals.	Males.	Females.	Children.	Totals.
Scandinavian—												
Danish	188	83	55	326	133	64	57	254	321	147	112	580
Icelandic	57	57	31	145	1	1	.....	2	58	58	31	147
Norwegian	458	226	104	788	667	277	73	1,017	1,125	503	177	1,805
Swedish	554	223	139	916	524	242	132	898	1,078	465	271	1,814
Serbian	198	14	8	220	6	2	1	9	204	16	9	229
Spanish	735	12	8	755	3	.....	.....	3	738	12	8	758
Swiss	124	55	30	209	19	9	6	34	143	64	36	243
Turkish—												
Turkish, N.E.S.	26	3	4	33	6	1	1	8	32	4	5	41
Armenian	34	1	1	36	3	1	.....	4	37	2	1	40
Syrian	48	22	9	79	8	2	3	13	56	24	12	92
U.S.A. Citizens	14	19	8	41	2,312	2,774	585	5,671	2,326	2,793	593	5,712
Venezuelan	.....	.....	.....	.....	1	.....	.....	1	1	.....	.....	1
West Indian	278	66	12	356	7	12	3	22	285	78	15	378
Total immigration	43,005	25,430	16,575	85,010	9,321	7,517	3,323	20,161	52,326	32,947	19,898	105,171
Returned Canadian	28,348	11,623	5,764	45,735	.....	.....	.....	.....	28,348	11,623	5,764	45,735
Tourist	5,593	2,167	437	8,107	40	24	5	69	5,543	2,191	442	8,176
Totals	76,856	39,220	22,776	138,852	9,361	7,541	3,328	20,230	86,217	46,761	26,104	159,082

TABLE III.—Monthly arrivals of Immigrants for Canada, by Nationalities, at Ocean Ports, for the Fiscal Year ended March 31, 1915.

—	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Totals
African, South	6	1	3	6	1	4					2		23
Albanian				4									4
Argentinian			1		2			2					5
Australian	11	1	6	16	1	5	5	1	2		1	2	51
Austro-Hungar'n-													
Austrian, N.E.S	81	125	189	66	39	1	1						502
Bohemian	21	40	22	8	3								94
Bukowinian	47	5	16		4								72
Croatian	47	53	45	18	1								164
Dalmatian	12	12											24
Galician	22		2	9	3								36
Hungarian, N.E.S	18	19	107	61	13								218
Magyar	60	93	19	4									176
Ruthenian	1,362	2,271	1,536	567	91			3					5,830
Slovak	20	4	10										34
Belgian	183	256	135	134	24	14	8	16	20	10	25	24	1,149
Bermudian			2				1	1					4
Bulgarian	1,686	1,811	485	48	10	8							4,048
Chinese	429	442	295	16	29	5	11	11	10		10		1,258
Cuban		1											1
Dutch	187	162	55	75	59	9	21	3	17	5	2	10	605
French	422	255	162	174	74	31	23	13	17	7	13	15	1,206
German—													
German, N.E.S	670	963	280	410	112	7	5	5	3	2	2	11	2,470
Bavarian	2												2
Great Britain and Ireland—													
English	7,665	7,426	4,274	3,601	2,007	1,817	1,137	1,073	470	215	327	795	30,807
Irish	737	910	637	391	244	197	184	98	23	12	40	52	3,525
Scotch	1,492	1,866	2,120	766	740	510	278	202	138	27	73	134	8,346
Welsh	138	141	84	64	33	42	23	29	17	8	10	9	598
Greek	533	216	214	123	18	8	8	10	7	1	1	8	1,147
Hawaiian					18								18
Hebrew—													
Hebrew, N.E.S	35	46	81	41	17	10	6	8	12		3	7	266
" Austrian	20	37	46	36	21								160
" German			1										1
" Polish	2	2	1	1									6
" Russian	370	431	752	661	370	33	29	9	5	10	1	3	2,674
Italian	2,869	2,274	462	232	121	49	48	40	46	35	27	25	6,228
Jamaican	5		13	2	3	1	5						29
Japanese	119	113	99	60	62	22	30	16	26	11	13	21	592
Macedonian	1	30	44	31	26								132
Maltese	8		5	3	3								19
Montenegrin	5	2	1	1									9
Negro	51	46	58	19	13	5	4	2		1	3		202
Newfoundland	157	41	30	12	23	14	32	12	11	1		5	338
New Zealand	5	1	5	1	1	1		2		5			21
Persian	1		1	2	3								7
Polish—													
Polish, N.E.S.	29	67	45	8	4								153
" Austrian	271	550	266	146	38			1					1,272
" German	2	4		1									7
" Russian	137	165	122	55	35	11		17			1	1	544
Portuguese	5		3										8
Roumanian	175	139	18	20	6				2		1		361
Russian													
Russian, N.E.S.	2,233	1,442	920	369	195	17	12	3	4	3	1	2	5,201
Finnish	86	149	98	87	24	2	1	4		1	1	6	459
Scandinavian—													
Danish	86	85	40	35	15	8	16	5	6	2	7	21	326
Icelandic		24	70	45	4	1					1		145
Norwegian	146	127	137	119	94	61	41	23	16	1	15	8	788
Swedish	225	239	149	125	49	34	23	22	24	3	8	15	916
Serbian	53	53	57	48	8							1	220

TABLE III.—Monthly arrivals of Immigrants for Canada, by Nationalities, at Ocean Ports, for the Fiscal Year ended March 31, 1915.—*Concluded.*

—	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Totals.
Spanish	300	409	31	9	2	2	....	....	.....	.....	1	1	755
Swiss	57	53	47	17	11	3	4	4	5	.....	1	7	209
Turkish—													
Turkish, N.E.S	10	8	1	3	2	8	.....	1	.....	.....	.....	.....	33
Armenian	14	6	....	3	6	5	.....	2	.....	.....	.....	.....	36
Syrian	15	13	17	17	6	1	1	....	5	2	2	.....	79
U.S.A. Citizens	9	4	5	6	7	4	2	3	.....	.....	.....	1	41
West Indian	34	121	107	54	33	6	.....	1	.....	.....	.....	.....	356
Totals	23,686	23,754	14,431	8,830	4,728	2,956	1,959	1,642	886	362	592	1,184	85,010

TABLE IV.—Monthly Arrivals of Immigrants for Canada, by Occupation and Destination, at Ocean Ports, for the Fiscal Year ended March 31, 1915.

——	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Totals
Agriculturists....	5,718	5,166	3,433	1,918	799	254	240	245	120	51	104	365	18,413
General labourers	11,319	10,242	4,130	1,832	743	323	150	187	86	22	19	59	29,112
Mechanics.....	2,559	3,343	2,398	1,724	1,031	564	327	238	133	35	52	113	12,517
Clerks,traders,etc	878	1,069	727	479	412	246	110	101	43	18	53	39	4,175
Miners.....	366	341	262	222	110	57	49	17	14	2	9	13	1,462
Female servants.	1,649	1,765	1,616	1,040	557	520	376	281	133	58	123	121	8,239
Not classified....	1,197	1,828	1,865	1,615	1,076	992	707	573	357	176	232	474	11,092
Totals.....	23,686	23,754	14,431	8,830	4,728	2,956	1,959	1,642	886	362	592	1,184	85,010
Maritime Provinces.....	1,463	867	640	309	254	98	68	76	99	35	37	65	4,011
Quebec.....	4,999	6,174	3,081	1,769	914	604	402	349	155	80	108	83	18,718
Ontario.....	8,932	9,144	5,490	3,436	1,838	1,434	695	650	321	153	236	546	32,875
Manitoba.....	2,658	2,568	1,819	1,089	544	192	180	125	69	13	36	136	9,429
Saskatchewan....	1,810	1,686	1,291	960	383	186	162	141	61	24	51	163	6,918
Alberta.....	1,793	1,816	1,081	679	395	195	166	135	72	19	55	100	6,506
British Columbia	2,031	1,498	1,027	588	399	247	286	166	109	38	69	91	6,549
Yukon Territory.	.....	1	2	.....	1	.....	.....	.....	.....	.....	.....	.....	4
Totals.....	23,686	23,754	14,431	8,830	4,728	2,956	1,959	1,642	886	362	592	1,184	85,010

TABLE V.—Nationality, Sex, Occupation, and Destination of Immigrant Arrivals for Canada, at Ocean Ports, for the Fiscal Year ended March 31, 1915.

—	Sex.				Trade or Occupation.								
					Farmers and Farm Labourers Class.			General Labourers.			Mechanics.		
	Males.	Females.	Children.	Totals.	Males.	Females.	Children.	Males.	Females.	Children.	Males.	Females.	Children.
African, South	13	5	5	23	2	2	1	1			6	1	3
Albanian		2	2	4					2	2			
Argentinian	2	1	2	5							1	1	
Australian	25	18	8	51	4	1	2	3	1	1	6	4	1
Austro-Hungarian—													
Austrian, N.E.S.	271	136	95	502	57	24	40	168	42	33	29	14	12
Bohemian	48	25	21	94	14	8	15	13	2	1	4	1	
Bukowinian	41	18	13	72	14	6	8	26	3	4			
Croatian	100	34	30	164	20	11	12	64	12	8	5	1	
Dalmatian	21	1	2	24	1	1	2	20					
Galician	25	7	4	36	4	2	1	20		1		1	
Hungarian, N.E.S.	129	54	35	218	47	11	9	73	13	11	5	3	4
Magyar	110	33	33	176	47	14	13	55	17	19	1	1	
Ruthenian	3,700	1,230	900	5,830	1,155	457	540	2,508	376	300	14	3	1
Slovak	24	5	5	34	9	3	5	14					
Belgian	581	316	252	1,149	206	71	73	140	41	54	128	63	52
Bermudian	1	2	1	4				1					
Bulgarian	4,012	18	18	4,048	117	1	3	3,876	11	12	11	4	3
Chinese	1,147	40	71	1,258				788	5	5	1		
Cuban	1			1									
Dutch	288	159	158	605	131	33	64	54	17	19	70	32	33
French	644	362	200	1,206	273	70	56	89	16	10	110	60	32
German—													
German, N.E.S.	1,196	616	658	2,470	601	261	379	210	70	108	193	59	64
Bavarian	1	1		2	1	1							
Great Britain and Ireland—													
English	10,047	12,471	8,289	30,807	4,240	1,593	1,739	1,436	1,195	1,345	2,087	2,300	2,005
Irish	1,441	1,469	615	3,525	696	136	135	221	113	130	179	166	143
Scotch	2,439	3,834	2,073	8,346	909	255	366	332	298	367	592	678	638
Welsh	239	226	133	598	102	22	24	26	16	30	37	39	26
Greek	1,015	87	45	1,147	43	2	4	896	44	27	17	4	5
Hawaiian	16	1	1	18	2			14	1	1			

Hebrew—													
Hebrew, N.E.S.	113	70	83	266	6	1		26	8	20	38	29	31
" Austrian	53	65	42	160	7	1		8	18	11	19	24	19
" German	1			1							1		
" Polish	3	2	1	6				1				1	
" Russian	917	898	859	2,674	45	23	38	138	59	70	536	481	447
Italian	5,191	646	391	6,228	126	20	26	4,897	430	235	75	23	19
Jamaican	6	20	3	29				1			3	9	1
Japanese	191	358	43	592	46	20	2	87	141	21	4	10	1
Macedonian	131	1		132	10			120			1		
Maltese	15	4		19	5			6			3	2	
Montenegrin	7	1	1	9	1			6					
Negro	131	64	7	202	2	1		91	8	5	22	6	
Newfoundland	191	89	58	338	1			158	10	20	17	4	5
New Zealand	13	6	2	21	4				1		5	1	
Persian	5		2	7				4			1		2
Polish—													
Polish, N.E.S.	87	37	29	153	26	10	10	44	9	8	6	2	3
" Austrian	656	351	265	1,272	235	80	124	371	91	89	37	13	9
" German	7			7	5			1					
" Russian	319	125	100	544	56	17	26	228	34	30	18	6	1
Portuguese	7	1		8				5	1				
Roumanian	259	55	47	361	62	15	21	183	23	17	9	3	2
Russian—													
Russian, N.E.S.	4,149	553	499	5,201	611	166	258	3,372	137	117	97	48	45
Finnish	262	132	65	459	27	13	20	204	27	24	14	8	8
Scandinavian—													
Danish	188	83	55	326	86	14	14	52	15	13	33	10	12
Icelandic	57	57	31	145	21	12	12	23	5	8	7	5	1
Norwegian	458	226	104	788	260	44	45	118	14	22	52	19	14
Swedish	554	223	139	916	268	56	67	203	21	22	55	15	16
Serbian	198	14	8	220	22	3	2	175	10	6	1		
Spanish	735	12	8	755	21	3		690	3	4	5	2	
Swiss	124	55	30	209	62	11	8	20	5	4	21	5	2
Turkish—													
Turkish, N.E.S.	26	3	4	33	5			14	1		3	1	1
Armenian	34	1	1	36	3			25			2		
Syrian	48	22	9	79	9	3	1	20	5	1	6	2	3
U.S.A. Citizens	14	19	8	41	5	1	7	3			1	2	
West Indian	278	66	12	356	10			151	9	4	96	3	
Totals	43,005	25,430	16,575	85,010	10,742	3,499	4,172	22,493	3,380	3,239	4,684	4,169	3,664

TABLE V.—Nationality, Sex, Occupation, and Destination of Immigrant Arrivals for Canada, at Ocean Ports, for the Fiscal Year ended March 31, 1915.—*Concluded.*

—	Trade or Occupation.										Destination.							
	Clerks, Traders, etc.			Miners.			Female Servants.	Not Classified.			Maritime Provinces.	Quebec.	Ontario.	Manitoba.	Saskatchewan	Alberta.	British Columbia.	Yukon Territory.
	Males.	Females	Children.	Males.	Females	Children.		Males.	Females	Children.								
African, South	2							2	2	1	2	6	9		1	4	1	
Albanian												4						
Argentinian				1						2		3				2		
Australian	4	2	1				2	8	8	3	2	11	15	4	5	3	11	
Austro-Hungarian—																		
Austrian, N.E.S.	6	1	1	3			46	8	9	9	12	188	98	79	86	26	13	
Bohemian	1			16	2	2	8		4	3	18	10	17	16	6	16	11	
Bukowinian				1			9			1	6	11	18	17	9	11		
Croatian	1			10	5	8	3		2	2	23	8	79		21	15	18	
Dalmatian													14			1	9	
Galician				1			2		2	2	1	4	10	12	3	6		
Hungarian, N.E.S.	2			1			18	1	9	11	8	9	102	19	64	11	5	
Magyar				5			1	2		1	3	13	61	17	72	8	2	
Ruthenian		1	1	19	4	6	353	4	36	52	67	1,225	1,374	1,622	696	783	63	
Slovak				1			2				2	1	11	2	3	3	12	
Belgian	19	7	4	59	37	36	47	29	50	33	142	476	82	290	63	70	26	
Bermudian							1		1	1	1	2	1					
Bulgarian	3			2			1	3	1		133	1,537	2,288	1	35	44	10	
Chinese	309	27	34					49	8	32	5	166	181	18	5	20	863	
Cuban	1											1						
Dutch	17	2	5	2			32	14	43	37	46	73	180	96	71	117	22	
French	25	12	6	65	43	63	47	82	114	33	183	591	99	122	102	74	35	
German—																		
German, N.E.S.	70	14	4	64	28	48	95	58	89	55	171	289	397	436	609	502	66	
Bavarian											2							
Great Britain and Ireland—																		
English	755	701	375	204	89	124	4,213	1,325	2,380	2,701	1,238	4,478	15,204	2,559	2,640	2,340	2,347	1
Irish	161	109	46	14			664	170	281	161	117	632	1,644	450	230	238	213	1
Scotch	264	331	137	89	52	77	1,604	253	616	488	345	1,510	3,335	1,069	567	791	729	
Welsh	16	10	11	22	4	5	84	36	51	37	39	84	177	61	59	88	90	
Greek	15	5	2	31	1		20	13	11	7	126	459	411	23	9	17	102	
Hawaiian												8	7		2		1	

Hebrew—																		
Hebrew, N.E.S.	34	14	17				7	9	11	15	1	181	56	21	1	4	2	
" Austrian	17	9	3				6	2	7	9		86	59	10	4	1		
" German											1							
" Polish	1							1	1	1		3	3					
" Russian	131	100	106	2	1		74	65	160	198	39	1,008	810	659	70	62	26	
Italian	23	6	6	31	4	8	40	39	123	97	141	1,993	3,103	163	50	201	577	
Jamaican	1						7	1	4	2	2	11	16					
Japanese	16	8		1			4	37	175	19		4	1	2	4	579	2	
Macedonian							1				5	16	108	1		2		
Maltese	1	2										9	7	1		1	1	
Montenegrin									1	1		1	3			1	4	
Negro	10	6					29	6	14	2	96	42	63	1				
Newfoundland	3			7			59	5	16	33	271	51	10	2	1		3	
New Zealand	2			1			2	1	2	2	2	6	4			3	6	
Persian													7					
Polish—																		
Polish, N.E.S.	1			10	2	4	10		4	4	10	24	42	24	28	22	3	
" Austrian	1			7	5	14	142	5	20	29	31	193	282	465	127	164	10	
" German								1					2	5				
" Russian	1	3	7	10			40	6	25	36	31	185	199	58	30	36	5	
Portuguese	2										3						5	
Roumanian	3	1	1	2			7		6	6	10	103	115	39	73	13	8	
Russian—																		
Russian, N.E.S.	17	11	10	33	4	3	138	19	49	66	319	1,902	1,118	560	570	361	371	
Finnish	1	1		14	6	5	68	2	9	8	1	39	321	10	22	29	37	
Scandinavian—																		
Danish	5	6	6				28	12	10	10	25	77	70	55	30	56	13	
Icelandic	3	1					27	3	7	10	1	1		122	13	1	7	
Norwegian	5			3			119	20	30	23	18	54	101	108	256	158	93	
Swedish	3	2		14	1	4	106	11	22	30	31	79	161	156	189	168	132	
Serbian							1				2	30	138		48	1	1	
Spanish				15	2	1		4	2	3	15	612	114	6	1	1	6	
Swiss	9	1	1		1	1	15	12	17	14	4	81	27	42	31	19	5	
Turkish—																		
Turkish, N.E.S.	3							1	1	3	1	10	22					
Armenian	1							3	1	1	3	5	25				3	
Syrian	6	4					2	7	6	4	5	39	24	3	4	3	1	
U.S.A. Citizens	4	1			1		7	1	7	1	5	10	8	2	10	4	2	
West Indian	11	3	4	1			48	9	3	4	246	63	39	2		1		
Totals	1,986	1,401	788	761	292	409	8,239	2,339	4,450	4,303	4,011	18,718	32,875	9,429	6,918	6,506	6,549	4

PORT OF NORTH SYDNEY.

For the fiscal year 1914-15, there arrived at the Port of North Sydney, 8,374 passengers, of whom 3,569 travelled saloon, and 4,805 steerage. Of the saloon passengers, 2,674 were destined to Canada, and 895 to the United States. Of the steerage passengers, 3,554 were for Canada, and 1,251 for the United States. Included in the steerage passengers for Canada were 1,104 returned Canadians and 2,003 tourists, leaving the immigration proper at 447 souls, a decrease at this port, as compared with the preceding fiscal year, of 218 persons.

Table I deals with the total arrivals of saloon passengers; Table II with the total arrivals of steerage passengers; Table III with the monthly arrivals of immigrants for Canada; and Tables IV and V give summaries of the information obtained from immigrants for Canada upon arrival.

TABLE I.—Nationality and sex of saloon passengers arriving at the Port of North Sydney, for the Fiscal Year ended March 31, 1915.

—	CANADA.				UNITED STATES.				CANADA AND UNITED STATES.			
	Males.	Females.	Children.	Totals.	Males.	Females.	Children.	Totals.	Males.	Females.	Children.	Totals.
Austrian	.....	.....	.....	.....	1	.....	.....	1	1	.....	.....	1
Dutch	.....	.....	.....	.....	1	.....	1	2	1	.....	1	2
French	1	4	2	7	3	4	.....	7	4	8	2	14
German	.....	.....	.....	.....	1	.....	.....	1	1	.....	.....	1
Gt. Britain and Ireland:												
English	2	1	.....	3	30	7	.....	37	32	8	.....	40
Irish	1	.....	.....	1	1	.....	.....	1	2	.....	.....	2
Scotch	1	.....	.....	1	6	.....	.....	6	7	.....	.....	7
Welsh	2	.....	.....	2	.....	.....	.....	.....	2	.....	.....	2
Newfoundland	59	40	18	117	137	158	40	335	196	198	58	452
Russian	1	.....	.....	1	8	.....	.....	8	9	.....	.....	9
Scandinavian:												
Norwegian	.....	.....	.....	.....	1	.....	.....	1	1	.....	.....	1
Swedish	.....	.....	.....	.....	2	.....	.....	2	2	.....	.....	2
Swiss	.....	.....	.....	.....	1	.....	.....	1	1	.....	.....	1
Syrian	1	.....	.....	1	3	.....	.....	3	4	.....	.....	4
U.S.A. Citizens	28	10	.....	38	310	114	40	464	338	124	40	502
Returned Canadian	780	340	147	1,267	.....	.....	.....	.....	780	340	147	1,267
Tourist	746	390	100	1,236	8	16	2	26	754	406	102	1,262
Totals	1,622	785	267	2,674	513	299	83	895	2,135	1,084	350	3,569

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TABLE II.—Nationality and Sex of Steerage Passengers arriving at the Port of North Sydney, for the Fiscal Year ended March 31, 1915.

	Canada.				United States.				Canada and United States.			
	Males.	Females.	Children.	Totals.	Males.	Females.	Children.	Totals.	Males.	Females.	Children.	Totals.
Dutch	.....	.....	.....	.....	1	.....	.....	1	1	.....	.....	1
French	5	1	1	7	.....	.....	.....	.....	5	1	1	7
German	1	.....	.....	1	.....	1	.....	1	1	1	.....	2
Gt. Britain and Ireland:												
English	.....	1	1	2	13	.....	.....	13	13	1	1	15
Irish	1	.....	.....	1	2	.....	.....	2	3	.....	.....	3
Scotch	.....	1	.....	1	.....	.....	.....	.....	.....	1	.....	1
Hebrew	1	.....	.....	1	2	.....	.....	2	3	.....	.....	3
Italian	1	.....	.....	1	.....	.....	.....	.....	1	.....	.....	1
Newfoundland	159	65	43	267	560	424	141	1,125	719	489	184	1,392
Roumanian	.....	.....	.....	.....	1	1	1	3	1	1	1	3
Russian	20	.....	.....	20	1	.....	.....	1	21	.....	.....	21
Scandinavian:												
Norwegian	1	.....	.....	1	.....	.....	.....	.....	1	.....	.....	1
Swedish	.....	2	.....	2	1	.....	.....	1	1	2	.....	3
Syrian	2	.....	.....	2	1	.....	.....	1	3	.....	.....	3
U.S.A. Citizens	2	.....	.....	2	17	9	71	97	19	9	71	99
West Indian	138	1	.....	139	.....	.....	.....	.....	138	1	.....	139
Total immigration	331	71	45	447	599	435	213	1,247	930	506	258	1,694
Returned Canadian	702	217	185	1,104	.....	.....	.....	.....	702	217	185	1,104
Tourist	1,564	309	130	2,003	.....	1	3	4	1,564	310	133	2,007
Totals	2,597	597	360	3,554	599	436	216	1,251	3,196	1,033	576	4,805

TABLE III.—Monthly arrivals of Immigrants for Canada, by Nationalities, at the Port of North Sydney, for the Fiscal Year ended March 31, 1915.

——	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Totals
French	2				5								7
German	1												1
Great Britain and Ireland:													
English							2						2
Irish					1								1
Scotch					1								1
Hebrew					1								1
Italian	1												1
Newfoundland	151	19	22	7	14	10	31	6	6	1			267
Russian	6	14											20
Scandinavian:													
Norwegian			1										1
Swedish								2					2
Syrian										2			2
U.S.A. Citizens	2												2
West Indian		60	40	20	19								139
Totals	163	93	63	27	41	10	33	8	6	3			447

TABLE IV.—Monthly arrivals of Immigrants for Canada, by Occupation and Destination, at the Port of North Sydney, for the Fiscal Year ended March 31, 1915.

———	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Totals
Agriculturists		3	1	1	2								7
General labourers	139	41	18	13	12			2	2	2			229
Mechanics	2	43	27	11	12				1				96
Clerks, traders, etc.	2		5		1								8
Miners	2	1	5										8
Female servants	17		3	1	1	3	13	5	3				46
Not classified	1	5	4	1	13	7	20	1		1			53
Totals	163	93	63	27	41	10	33	8	6	3			447
Maritime Provinces	145	69	60	24	30	5	14	7	6	3			363
Quebec	12	24	3	3	7	5	14	1					69
Ontario	6				1		2						9
Manitoba					2								2
Saskatchewan					1								1
British Columbia							3						3
Totals	163	93	63	27	41	10	33	8	6	3			447

TABLE V.—Nationality, Sex, Occupation and Destination of Immigrant Arrivals for

	Sex.				Trade or								
					Farmers and Farm Labourers Class.			General Labourers.			Mechanics.		
	Males.	Females.	Children.	Totals.	Males.	Females.	Children.	Males.	Females.	Children.	Males.	Females.	Children.
French	5	1	1	7	.....	.....	.....	1	.....	.....	3	....	....
German	1	....	....	1	.....	.....	.....	1	.....	.....	....	....	....
Great Britain and Ireland—													
English	....	1	1	2	.....	.....	.....	.....	.....	.....	....	....	....
Irish	1	....	....	1	.....	.....	.....	1	.....	.....	....	....	....
Scotch	....	1	....	1	.....	.....	.....	.....	.....	.....	....	....	....
Hebrew	1	....	....	1	.....	.....	.....	.....	.....	.....	....	....	....
Italian	1	....	....	1	.....	.....	.....	.....	.....	.....	....	....	....
Newfoundland	159	65	43	267	1	.....	.....	139	8	15	6	2	....
Russian	20	....	....	20	.....	.....	.....	19	.....	.....	....	....	....
Scandinavian													
Norwegian	1	....	....	1	.....	.....	.....	.....	.....	.....	1	....	....
Swedish	....	2	....	2	.....	.....	.....	.....	.....	.....	....	....	....
Syrian	2	....	....	2	.....	.....	.....	2	.....	.....	....	....	....
U.S.A. Citizens	2	....	....	2	.....	.....	.....	2	.....	.....	....	....	....
West Indian	138	1	....	139	6	.....	.....	41	.....	.....	84	....	....
Totals	331	71	45	447	7	.....	.....	206	8	15	94	2	....

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Canada, at the Port of North Sydney, for the Fiscal Year ended March 31, 1915.

Occupation.										Destination.					
Clerks, Traders, etc.			Miners.			Female Servants.	Not Classified.			Maritime Provinces.	Quebec.	Ontario.	Manitoba.	Saskatchewan.	British Columbia.
Males.	Females.	Children.	Males.	Females.	Children.		Males.	Females.	Children.						
.....	.....	.....	.....	.....	.....	.....	1	1	1	3	3	1			
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	1	1	.....	.....	2	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	1	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	1	.....	.....	1	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	1	.....	.....	1	.....	.....	.....	.....	.....
2	.....	.....	7	.....	.....	43	4	12	28	207	49	5	2	1	3
1	.....	.....	.....	.....	.....	.....	.....	.....	.....	6	14	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	2	.....	.....	.....	2	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	1	.....	.....	.....	.....
5	.....	.....	1	.....	.....	1	1	.....	.....	139	.....	.....	.....	.....	.....
8	.....	.....	8	.....	.....	46	8	15	30	363	69	9	2	1	3

PORT OF HALIFAX.

For the fiscal year, 1914-15, there arrived at the Port of Halifax, 24,289 passengers, of whom 1,387 travelled saloon and 22,902 steerage. Of the saloon passengers, 1,269 were destined to Canada and 118 to the United States. Of the steerage passengers, 19,956 were for Canada and 2,946 for the United States. Included in the steerage passengers for Canada were 5,293 returned Canadians and 816 tourists, leaving the immigration proper at 13,847 souls, a decrease at this port, as compared with the preceding fiscal year of 38,947 persons.

Table I deals with the total arrivals of saloon passengers; Table II with the total arrivals of steerage passengers; Table III with the monthly arrivals of immigrants for Canada; and Tables IV and V give summaries of the information obtained from immigrants for Canada upon arrival.

TABLE I.—Nationality and Sex of Saloon Passengers arriving at the Port of Halifax, for the Fiscal Year ended March 31, 1915.

	Canada.				United States.				Canada and United States.			
	Males.	Females.	Children.	Totals.	Males.	Females.	Children.	Totals.	Males.	Females.	Children.	Totals.
African, South	1			1					1			1
Australian		1		1						1		1
Austrian	2			2	1			1	3			3
Belgian		1		1						1		1
French		1		1	1	1	1	3	1	2	1	4
German		1		1	1			1	1	1		2
Great Britain and Ireland—												
English	30	32	18	80	8	1		9	38	33	18	89
Irish	5			5	3			3	8			8
Scotch	7	1		8	1			1	8	1		9
Welsh	2	1		3					2	1		3
Hebrew, Russian	1	4	1	6		3		3	1	7	1	9
Italian	1			1					1			1
Newfoundland	13	5	1	19	7	17	1	25	20	22	2	44
Russian	3	2		5	2	1		3	5	3		8
Scandinavian—												
Danish	1			1					1			1
Icelandic					3			3	3			3
U.S.A. Citizens		1		1	32	26	2	60	32	27	2	61
Returned Canadian	432	196	48	676					432	196	48	676
Tourist	251	178	28	457	3	3		6	254	181	28	463
Totals	749	424	96	1,269	62	52	4	118	811	476	100	1,387

TABLE II.—Nationality and Sex of Steerage Passengers arriving at the Port of Halifax, for the Fiscal Year ended March 31, 1915.

	CANADA.				UNITED STATES.				CANADA AND UNITED STATES.			
	Males.	Females.	Children.	Totals.	Males.	Females.	Children.	Totals.	Males.	Females.	Children.	Totals.
African, South	1	1	1	3	.....	.....	.....	.....	1	1	1	3
Austro-Hungarian—												
Austrian, N.E.S.	36	7	11	54	3	3	1	7	39	10	12	61
Bohemian	13	4	4	21	2	3	1	6	15	7	5	27
Bukowinian	25	12	10	47	.....	.....	.....	.....	25	12	10	47
Croatian	23	8	9	40	1	.....	2	3	24	8	11	43
Dalmatian	9	1	2	12	.....	.....	.....	.....	9	1	2	12
Galician	15	1	1	17	.....	.....	.....	.....	15	1	1	17
Hungarian, N.E.S.	20	3	.....	23	6	10	.....	16	26	13	.....	39
Magyar	35	8	4	47	1	.....	.....	1	36	8	4	48
Ruthenian	1,075	263	190	1,528	2	3	.....	5	1,077	266	190	1,533
Slovak	8	.....	.....	8	.....	.....	.....	.....	8	.....	.....	8
Belgian	77	29	25	131	4	1	.....	5	81	30	25	136
Bulgarian	820	.....	.....	820	46	1	1	48	866	1	1	868
Dutch	42	12	15	69	17	7	11	35	59	19	26	104
French	104	59	67	230	.....	.....	.....	.....	104	59	67	230
German—												
German, N.E.S.	250	107	163	520	18	27	16	61	268	134	179	581
Bavarian	1	1	.....	2	.....	.....	.....	.....	1	1	.....	2
Great Britain and Ireland—												
English	1,753	1,607	1,039	4,399	79	71	37	187	1,832	1,678	1,076	4,586
Irish	170	140	41	351	4	5	2	11	174	145	43	362
Scotch	338	336	254	928	16	16	11	43	354	352	265	971
Welsh	52	33	20	105	5	1	4	10	57	34	24	115
Greek	178	4	3	185	3	.....	.....	3	181	4	3	188
Hebrew—												
Hebrew, N.E.S.	10	9	7	26	2	5	2	9	12	14	9	35
" Austrian	8	3	.....	11	2	1	5	8	10	4	5	19
" German	1	.....	.....	1	.....	.....	.....	.....	1	.....	.....	1
" Polish	1	.....	.....	1	.....	.....	.....	.....	1	.....	.....	1
" Russian	177	213	196	586	195	301	295	791	372	514	491	1,377
Italian	303	17	14	334	16	.....	.....	16	319	17	14	350
Jamaican	2	6	.....	8	.....	.....	.....	.....	2	6	.....	8
Japanese	.....	.....	.....	.....	2	.....	2	4	2	.....	2	4
Maltese	4	.....	.....	4	.....	.....	.....	.....	4	.....	.....	4
Montenegrin	1	.....	.....	1	.....	.....	.....	.....	1	.....	.....	1
Negro	33	1	.....	34	.....	.....	.....	.....	33	1	.....	34
Newfoundland	31	23	15	69	57	58	18	133	88	81	33	202
New Zealand	.....	2	.....	2	.....	.....	.....	.....	.....	2	.....	2
Persian	2	.....	2	4	1	.....	.....	1	3	.....	2	5
Polish—												
Polish, N.E.S.	19	9	5	33	.....	.....	.....	.....	19	9	5	33
" Austrian	164	58	45	267	3	8	4	15	167	66	49	282
" German	1	.....	.....	1	1	3	3	7	2	3	3	8
" Russian	89	17	15	121	72	48	24	144	161	65	39	265
Roumanian	118	15	23	156	.....	.....	.....	.....	118	15	23	156
Russian—												
Russian, N.E.S.	1,919	107	86	2,112	586	172	129	887	2,505	279	215	2,999
Finnish	42	13	8	63	70	24	13	107	112	37	21	170
Scandinavian—												
Danish	33	13	4	50	28	6	8	42	61	19	12	92
Icelandic	1	.....	.....	1	.....	.....	.....	.....	1	.....	.....	1
Norwegian	93	17	4	114	102	15	6	123	195	32	10	237
Swedish	135	32	13	180	86	26	10	122	221	58	23	302
Serbian	9	1	.....	10	2	1	.....	3	11	2	.....	13
Spanish	73	1	.....	74	.....	.....	.....	.....	73	1	.....	74
Swiss	15	4	3	22	.....	2	.....	2	15	6	3	24

TABLE II.—Nationality and Sex of Steerage Passengers arriving at the Port of Halifax, for the Fiscal Year ending March 31, 1915—*Concluded.*

	Canada.				United States.				Canada and United States.			
	Males.	Females.	Children.	Totals.	Males.	Females.	Children.	Totals.	Males.	Females.	Children.	Totals.
Turkish—												
Turkish, N.E.S	4	.....	.....	4	1	.....	.....	1	5	.....	.....	5
Syrian	7	2	.....	9	1	.....	.....	1	8	2	.....	10
U.S.A. Citizens	3	4	2	9	53	21	13	87	56	25	15	96
Total immigration	8,343	3,203	2,301	13,847	1,487	839	618	2,944	9,830	4,042	2,919	16,791
Returned Canadian	3,861	909	523	5,293	.....	.....	.....	.....	3,861	909	523	5,293
Tourist	609	177	30	816	1	1	.....	2	610	178	30	818
Totals	12,813	4,289	2,854	19,956	1,488	840	618	2,946	14,301	5,129	3,472	22,902

TABLE III.—Monthly arrivals of Immigrants for Canada, by Nationalities, at the Port of Halifax, for the Fiscal Year ended March 31, 1915.

	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Totals
African, South	3												3
Austro-Hungarian—													
Austrian, N.E.S	50	3			1								54
Bohemian	13	7	1										21
Bukowinian	47												47
Croatian	16	5	19										40
Dalmatian	12												12
Galician	16			1									17
Hungarian, N.E.S	18		5										23
Magyar	35	12											47
Ruthenian	1,213	293	17	3	2								1,528
Slovak	8												8
Belgian	105			3	1			3	1	5	2	11	131
Bulgarian	800	20											820
Dutch	63	2		2						2			69
French	133	29	30	13	18				1	3		3	230
German—													
German, N.E.S	369	112	14	17	8								520
Bavarian	2												2
Great Britain and Ireland—													
English	3,370	160	70	35	51	15	21	56	162	89	141	229	4,399
Irish	268	7	10	1	5	2	3	1	4	3	17	30	351
Scotch	637	11	19	3	12	1	5	15	54	17	57	97	928
Welsh	76	2	6	1	1				5	4	8	2	105
Greek	115	34	29	2	5								185
Hebrew—													
Hebrew, N.E.S	16	2							6		1	1	26
" Austrian	7		2	1	1								11
" German			1										1
" Polish	1												1
" Russian	183	99	159	66	73					6			586
Italian	298	7	5	21					1			2	334
Jamaican	1		2		2	1							8
Maltese	4			2									4
Montenegrin	1												1
Negro	14	12	7					1					34
Newfoundland	6	22	6	5	9	4	1	6	5			5	69
New Zealand										2			2
Persian			1		3								4
Polish													
Polish, N.E.S	23	6		4									33
" Austrian	207	37	3	18	2								267
" German	1												1
" Russian	86	25	7		2							1	121
Roumanian	137	19											156
Russian—													
Russian, N.E.S	1,610	373	91	13	22				1		1	1	2,112
Finnish	62										1		63
Scandinavian—													
Danish	43	1						1	1		2	2	50
Icelandic											1		1
Norwegian	102							1	4		7		114
Swedish	164		2					1	5	1	3	4	180
Serbian	10												10
Spanish	63		9	2									74
Swiss	22												22
Turkish—													
Turkish, N.E.S	4												4
Syrian	5	3		1									9
U.S.A. Citizens	6		2					1					9
Totals	10,445	1,303	517	214	218	23	30	86	250	132	241	388	13,847

TABLE IV.—Monthly arrivals of Immigrants for Canada, by Occupation and Destination, at the Port of Halifax, for the Fiscal Year ended March 31, 1915.

——	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Totals
Agriculturists	2,832	234	74	9	37	.....	5	18	60	19	33	168	3,489
General labourers	4,724	653	133	48	19	2	.....	12	27	12	3	14	5,647
Mechanics	1,018	123	126	61	66	4	12	10	49	16	27	62	1,574
Clerks, traders, etc	299	17	29	9	17	1	3	8	18	3	21	10	435
Miners	228	115	86	63	49	6	.....	1	6	1	9	9	573
Female servants	803	45	22	16	8	6	3	15	26	30	85	60	1,119
Not classified	541	116	47	8	22	4	7	22	64	51	63	65	1,010
Totals	10,445	1,303	517	214	218	23	30	86	250	132	241	388	13,847
Maritime Provinces	782	398	246	98	113	22	25	42	34	31	27	52	1,870
Quebec	2,083	165	50	26	17	.....	.....	11	35	40	44	27	2,498
Ontario	3,541	289	61	36	34	1	4	17	92	36	102	155	4,368
Manitoba	1,513	250	105	30	18	.....	.....	5	29	4	17	38	2,009
Saskatchewan	917	129	29	19	6	.....	.....	6	27	10	18	63	1,224
Alberta	925	60	18	4	27	.....	1	5	6	7	16	34	1,103
British Columbia	684	12	8	1	3	.....	.....	.....	27	4	17	19	775
Totals	10,445	1,303	517	214	218	23	30	86	250	132	241	388	13,847

TABLE V.—Nationality, Sex, Occupation and Destination of Immigrant Arrivals for

	Sex.				Trade or								
					Farmers and Farm Labourers Class.			General Labourers.			Mechanics.		
	Males.	Females.	Children.	Totals.	Males.	Females.	Children.	Males.	Females.	Children.	Males.	Females.	Children.
African, South	1	1	1	3	.....	1	1	.....	.....	.....	.....	.....	.....
Austro-Hungarian—													
Austrian, N.E.S.	36	7	11	54	5	2	5	22	2	2	5	1	3
Bohemian	13	4	4	21	3	2	4	1	.....	.....	.....	.....	.....
Bukowinian	25	12	10	47	5	1	5	19	3	4	.....	.....	.....
Croatian	23	8	9	40	1	2	1	13	.....	.....	.....	.....	.....
Dalmatian	9	1	2	12	1	1	2	8	.....	.....	.....	.....	.....
Galician	15	1	1	17	1	.....	.....	13	.....	.....	.....	.....	.....
Hungarian, N.E.S.	20	3	.....	23	1	.....	.....	18	2	.....	.....	.....	.....
Magyar	35	8	4	47	17	6	3	18	2	1	.....	.....	.....
Ruthenian	1,075	263	190	1,528	180	82	129	880	65	58	4	1	.....
Slovak	8	.....	.....	8	1	.....	.....	6	.....	.....	.....	.....	.....
Belgian	77	29	25	131	37	5	9	8	4	5	12	5	4
Bulgarian	820	.....	.....	820	3	.....	.....	815	.....	.....	.....	.....	.....
Dutch	42	12	15	69	24	5	7	4	2	4	7	.....	.....
French	104	59	67	230	21	5	6	15	4	4	6	2	2
German—													
German, N.E.S.	250	107	163	520	149	57	102	26	11	18	21	6	9
Bavarian	1	1	.....	2	1	1	.....	.....	.....	.....	.....	.....	.....
Great Britain and Irel'd													
English	1,753	1,607	1,039	4,399	904	296	352	219	149	151	287	239	174
Irish	170	140	41	351	86	17	19	23	7	2	20	13	8
Scotch	338	336	254	928	176	39	132	30	19	29	78	70	49
Welsh	52	33	20	105	22	5	2	5	2	3	7	5	5
Greek	178	4	3	185	.....	.....	.....	145	3	3	5	.....	.....
Hebrew—													
Hebrew, N.E.S.	10	9	7	26	.....	.....	.....	5	1	3	1	2	.....
" Austrian	8	3	.....	11	.....	.....	.....	1	.....	.....	5	2	.....
" German	1	.....	.....	1	.....	.....	.....	.....	.....	.....	1	.....	.....
" Polish	1	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....
" Russian	177	213	196	586	10	6	13	23	7	13	111	151	120
Italian	303	17	14	334	3	.....	1	274	13	8	10	.....	..
Jamaican	2	6	.....	8	.....	.....	.....	1	.....	.....	1	2	.....
Maltese	4	.....	.....	4	1	.....	.....	2	.....	.....	1	.....	.....
Montenegrin	1	.....	.....	1	.....	.....	.....	1	.....	.....	.....	.....	.....
Negro	33	1	.....	34	.....	.....	.....	26	.....	.....	7	.....	.....
Newfoundland	31	23	15	69	.....	.....	.....	19	2	5	10	2	5
New Zealand	.....	2	.....	2	.....	.....	.....	.....	.....	.....	.....	.....	.....
Persian	2	.....	2	4	.....	.....	.....	1	.....	.....	1	.....	2
Polish													
Polish, N.E.S.	19	9	5	33	4	1	1	10	1	.....	1	.....	.....
" Austrian	164	58	45	267	27	10	15	130	17	22	2	.....	.....
" German	1	.....	.....	1	.....	.....	.....	1	.....	.....	.....	.....	.....
" Russian	89	17	15	121	12	4	7	66	6	4	4	2	.....
Roumanian	118	15	23	156	24	6	12	92	4	8	1	1	.....
Russian—													
Russian, N.E.S.	1,919	107	86	2,112	92	29	46	1,768	40	30	31	7	6
Finnish	42	13	8	63	7	3	4	32	.....	1	2	1	1
Scandinavian—													
Danish	33	13	4	50	28	3	1	2	1	3	3	2	
Icelandic	1	.....	.....	1	1	.....	.....	.....	.....	.....	.....	.....	.....
Norwegian	93	17	4	114	61	2	.....	18	.....	.....	8	3	3
Swedish	135	32	13	180	68	11	11	54	2	2	8	1	.....
Serbian	9	1	.....	10	1	1	.....	8	.....	.....	.....	.....	.....
Spanish	73	1	.....	74	2	1	.....	61	.....	.....	.....	.....	.....
Swiss	15	4	3	22	8	2	.....	5	.....	.....	1	1	2
Turkish—													
Turkish, N.E.S.	4	.....	.....	4	.....	.....	.....	4	.....	.....	.....	.....	.....
Syrian	7	2	.....	9	1	.....	.....	3	.....	.....	1	.....	.....
U.S.A. Citizens	3	4	2	9	3	1	1	.....	.....	.....	.....	.....	.....
Totals	8,343	3,203	2,301	13,847	1,991	607	891	4,895	369	383	662	519	393

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Canada, at the Port of Halifax, for the Fiscal Year ended March 31, 1915.

Occupation.										Destination.						
Clerks, Traders, etc.			Miners.			Female Servants.	Not Classified.			Maritime Provinces.	Quebec.	Ontario.	Manitoba.	Saskatchewan.	Alberta.	British Columbia.
Males.	Females.	Children.	Males.	Females.	Children.		Males.	Females.	Children.							
1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2	.....	.....	.....	1
.....	.....	.....	3	.....	.....	2	1	.....	1	5	16	14	7	6	6	.....
.....	.....	.....	9	.....	.....	2	.....	.....	.....	10	1	.....	5	.....	5	.....
.....	.....	.....	1	.....	.....	8	.....	.....	1	6	9	11	9	4	8	.....
.....	.....	.....	9	5	8	1	.....	.....	.....	23	1	9	..	2	4	1
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2	.....	.....	1	9
.....	.....	.....	1	.....	...	.....	.....	1	1	1	3	2	8	.....	3	.....
.....	.....	.....	1	.....	.....	1	.....	.....	.....	5	1	8	4	1	4	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	1	10	7	22	5	1
.....	.....	.....	11	2	3	113	.....	.....	.....	31	258	324	539	188	175	13
.....	.....	.....	1	.....	.....	.....	.....	.....	.....	2	1	3	.....	.....	.....	2
5	4	2	10	7	5	3	5	1	.....	28	33	3	50	9	6	2
.....	.....	.....	2	.....	.....	.....	.....	.....	.....	31	306	466	.....	.....	9	8
1	.....	.....	2	.....	.....	2	4	3	4	6	5	16	22	9	11	.....
2	.....	.....	52	34	52	5	8	9	3	143	40	5	14	16	5	7
3	.....	.....	46	21	32	8	5	4	2	124	27	57	105	123	80	4
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2	.....	.....	.....	.....	.....	.....
101	73	43	40	23	24	602	202	225	295	641	400	1,748	445	455	404	306
17	14	2	3	.....	.....	73	21	16	10	49	56	118	52	30	24	22
20	18	6	16	6	9	143	18	41	29	125	66	436	107	65	65	64
4	3	4	10	1	1	12	4	5	5	16	6	25	9	19	10	20
.....	.....	.....	28	1	.....	.....	.....	.....	.....	119	6	47	.....	.....	2	11
4	2	4	.....	.....	.....	2	.....	2	.....	.....	24	2	.....	.....	.....	.....
2	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	9	.....	2	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	1	.....	.....	.....	.....	.....
24	23	34	.....	.....	.....	11	9	15	16	16	139	151	200	24	37	19
2	.....	1	13	2	3	2	1	.....	1	53	149	89	4	.....	14	25
.....	.....	.....	.....	.....	.....	4	.....	.....	.....	1	4	3	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3	1	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1
.....	.....	.....	.....	.....	.....	1	.....	.....	.....	33	1	.....	.....	.....	.....	.....
1	.....	.....	.....	.....	.....	15	1	4	5	64	.....	5	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	2	.....	.....	.....	1	1	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	4	.....	.....	.....	.....
.....	.....	.....	4	1	4	6	.....	.....	.....	9	5	3	8	3	5	..
.....	.....	.....	4	3	8	28	1	.....	.....	21	32	64	115	14	20	1
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....
1	1	3	6	.....	.....	4	.....	.....	1	15	32	41	9	13	8	3
.....	.....	.....	1	.....	.....	2	.....	2	3	10	37	46	13	38	4	8
1	.....	.....	26	2	3	29	1	.....	1	238	733	519	223	103	105	191
.....	.....	.....	1	.....	.....	7	.....	2	2	.....	6	33	.....	5	11	8
.....	.....	.....	.....	.....	.....	5	.....	2	.....	6	4	12	4	9	14	1
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....
1	.....	.....	.....	.....	.....	9	5	3	1	10	2	19	13	31	20	19
1	.....	.....	3	.....	.....	16	1	2	.....	7	5	47	32	27	34	28
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	8	.....	2	.....	.....
.....	.....	.....	10	.....	.....	.....	.....	.....	.....	11	59	4	.....	.....	.....	.....
1	1	1	.....	.....	.....	.....	.....	.....	.....	.....	12	2	3	2	3	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2	2	.....	.....	.....	.....
2	1	.....	.....	.....	.....	.....	.....	1	.....	2	2	5	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	1	.....	2	1	3	.....	1	.....	4	1	.....
194	141	100	313	108	152	1,119	228	340	382	1,870	2,498	4,368	2,009	1,224	1,103	775

PORT OF ST. JOHN.

For the fiscal year 1914-15, there arrived at the port of St. John 10,415 passengers, of whom 644 travelled saloon and 9,771 steerage. Of the saloon passengers, 640 were destined to Canada and 4 to the United States. Of the steerage passengers, 9,091 were for Canada and 680 for the United States. Included in the steerage passengers for Canada were 3,434 returned Canadians and 615 tourists, leaving the immigration proper at 5,042 souls, a decrease at this port, as compared with the preceding fiscal year of 10,577 persons.

Table I deals with the total arrivals of saloon passengers; Table II with the total arrivals of steerage passengers; Table III with the monthly arrivals of immigrants for Canada; and Tables IV and V give summaries of the information obtained from immigrants for Canada upon arrival.

TABLE I.—Nationality and Sex of Saloon Passengers arriving at the Port of St. John, for the Fiscal Year ended March 31, 1915.

	Canada.				United States.				Canada and United States.			
	Males.	Females.	Children.	Totals.	Males.	Females.	Children.	Totals.	Males.	Females.	Children.	Totals.
French	1	.....	.....	1	.....	.....	.....	.....	1	.....	.....	1
Gt. Britain and Ireland:												
English	10	10	4	24	.....	.....	.....	.....	10	10	4	24
Irish	9	.....	.....	9	.....	.....	.....	.....	9	.....	.....	9
Scotch	2	1	1	4	.....	.....	.....	.....	2	1	1	4
Negro	1	1	.....	2	.....	.....	.....	.....	1	1	.....	2
Swedish	1	1	.....	2	.....	.....	.....	.....	1	1	.....	2
U.S.A. Citizens	.....	.....	.....	.....	3	1	.....	4	3	1	.....	4
West Indian	11	12	3	26	.....	.....	.....	.....	11	12	3	26
Returned Canadian	187	115	14	316	.....	.....	.....	.....	187	115	14	316
Tourist	131	102	23	256	.....	.....	.....	.....	131	102	23	256
Totals	353	242	45	640	3	1	.....	4	356	243	45	644

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TABLE II.—Nationality and Sex of Steerage Passengers arriving at the Port of St. John, for the Fiscal Year ended March 31, 1915.

—	CANADA.				UNITED STATES.				CANADA AND UNITED STATES.			
	Males.	Females.	Children.	Totals.	Males.	Females.	Children.	Totals.	Males.	Females.	Children.	Totals.
African, South	1	1	.....	2	.....	.....	.....	.....	1	1	.....	2
Australian	1	.....	.....	1	1	.....	.....	1	2	.....	.....	2
Austro-Hungarian—												
Austrian, N.E.S.	13	4	7	24	5	1	1	7	18	5	8	31
Bohemian	2	.....	.....	2	.....	.....	.....	.....	2	.....	.....	2
Galician	4	1	.....	5	.....	1	.....	1	4	2	.....	6
Ruthenian	2	2	1	5	.....	.....	.....	.....	2	2	1	5
Belgian	109	40	41	190	13	2	4	19	122	42	45	209
Bermudian	.....	1	.....	1	.....	.....	.....	.....	.....	1	.....	1
Bulgarian	125	.....	.....	125	6	.....	.....	6	131	.....	.....	131
Dutch	24	12	7	43	5	.....	.....	5	29	12	7	48
French	49	22	10	81	1	1	.....	2	50	23	10	83
German	39	26	13	78	5	10	3	18	44	36	16	96
Gt. Britain and Ireland :												
English	1,181	1,019	762	2,962	92	96	56	244	1,273	1,115	818	3,206
Irish	131	97	47	275	9	5	3	17	140	102	50	292
Scotch	104	110	51	265	5	7	10	22	109	117	61	287
Welsh	31	13	6	50	3	6	3	12	34	19	9	62
Greek	244	5	.....	249	10	.....	.....	10	254	5	.....	259
Hebrew—												
Hebrew, N.E.S.	3	1	3	7	.....	1	4	5	3	2	7	12
" Austrian	.....	.....	.....	.....	1	.....	.....	1	1	.....	.....	1
" Russian	22	18	24	64	2	5	4	11	24	23	28	75
Italian	108	6	9	123	15	1	.....	16	123	7	9	139
Macedonian	1	.....	.....	1	.....	.....	.....	.....	1	.....	.....	1
Maltese	1	.....	.....	1	.....	.....	.....	.....	1	.....	.....	1
Montenegrin	2	.....	.....	2	.....	.....	.....	.....	2	.....	.....	2
Negro	70	35	6	111	9	2	.....	11	79	37	6	122
New Zealand	1	.....	.....	1	.....	.....	.....	.....	1	.....	.....	1
Polish—												
Polish, N.E.S.	3	.....	.....	3	.....	.....	.....	.....	3	.....	.....	3
" Austrian	2	.....	.....	2	.....	.....	.....	.....	2	.....	.....	2
" Russian	4	.....	1	5	2	1	.....	3	6	1	1	8
Portuguese	3	.....	.....	3	.....	.....	.....	.....	3	.....	.....	3
Roumanian	.....	1	.....	1	1	.....	.....	1	1	1	.....	2
Russian—												
Russian, N.E.S.	17	8	11	36	11	7	9	27	28	15	20	63
Finnish	13	1	.....	14	26	14	9	49	39	15	9	63
Scandinavian—												
Danish	21	5	2	28	23	17	9	49	44	22	11	77
Norwegian	21	4	.....	25	26	10	4	40	47	14	4	65
Swedish	25	11	4	40	28	5	13	46	53	16	17	86
Serbian	2	.....	.....	2	.....	.....	.....	.....	2	.....	.....	2
Spanish	3	.....	.....	3	.....	.....	.....	.....	3	.....	.....	3
Swiss	8	5	3	16	.....	.....	.....	.....	8	5	3	16
Syrian	1	.....	.....	1	.....	.....	.....	.....	1	.....	.....	1
U.S.A. Citizens	.....	.....	.....	.....	33	4	.....	37	33	4	.....	37
West Indian	129	56	10	195	5	12	3	20	134	68	13	215
Total immigration	2,520	1,504	1,018	5,042	337	208	135	680	2,857	1,712	1,153	5,722
Returned Canadian	2,315	717	402	3,434	.....	.....	.....	.....	2,315	717	402	3,434
Tourist	490	78	47	615	.....	.....	.....	.....	490	78	47	615
Totals	5,325	2,299	1,467	9,091	337	208	135	680	5,662	2,507	1,602	9,771

TABLE III.—Monthly Arrivals of Immigrants for Canada, by Nationalities, at the Port of St. John, for the Fiscal Year ended March 31, 1915.

——	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Totals
African, South	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2	.....	2
Australian	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	1
Austro-Hungarian—													
Austrian, N.E.S.	23	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	24
Bohemian	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2
Galician	5	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	5
Ruthenian	5	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	5
Belgian	169	.....	.....	.....	.....	.....	.....	.....	14	2	3	2	190
Bermudian	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	1
Bulgarian	125	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	125
Dutch	40	.....	.....	.....	.....	.....	.....	.....	1	2	.....	.....	43
French	76	.....	1	.....	.....	.....	.....	.....	2	1	.....	1	81
German	74	4	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	78
Great Britain and Ireland—													
English	2,032	7	3	1	.....	.....	.....	.....	244	78	133	464	2,962
Irish	225	1	.....	.....	.....	.....	.....	1	10	9	16	13	275
Scotch	175	4	.....	.....	.....	.....	.....	.....	60	3	6	17	265
Welsh	30	.....	.....	.....	.....	.....	.....	.....	11	3	2	4	50
Greek	249	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	249
Hebrew—													
Hebrew, N.E.S.	1	.....	.....	.....	.....	.....	.....	.....	6	.....	.....	.....	7
" Russian	64	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	64
Italian	122	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	123
Macedonian	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1
Maltese	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1
Montenegrin	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2
Negro	37	.....	50	6	13	2	3	.....	.....	.....	.....	.....	111
New Zealand	.....	.....	.....	.....	.....	..	.....	1	.....	.....	.....	.....	1
Polish—													
Polish, N.E.S.	3	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3
" Austrian	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2
" Russian	5	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	5
Portuguese	.....	.....	3	.....	.....	.....	.....	.....	.....	.....	.....	.....	3
Roumanian	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	1
Russian—													
Russian, N.E.S.	32	1	.....	.....	.....	.....	.....	.....	.....	3	.....	.....	36
Finnish	13	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	14
Scandinavian—													
Danish	19	1	.....	.....	.....	.....	.....	.....	1	.....	3	4	28
Norwegian	14	1	.....	.....	.....	.....	.....	.....	3	.....	3	4	25
Swedish	33	1	.....	.....	.....	.....	.....	.....	4	.....	1	1	40
Serbian	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2
Spanish	3	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3
Swiss	12	1	.....	.....	.....	.....	.....	.....	2	.....	1	.....	16
Syrian	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	1
West Indian	25	61	65	32	7	4	.....	1	.....	.....	.....	.....	195
Totals	3,621	84	122	39	20	6	3	4	358	102	173	510	5,042

TABLE IV.—Monthly arrivals of Immigrants for Canada, by Occupation and Destination, at the Port of St. John, for the Fiscal Year ended March 31, 1915.

——	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Totals
Agriculturists....	1,067	.....	2	3	.....	.....	.....	.....	51	24	48	140	1,335
General labourers	1,133	65	70	13	6	.....	.....	.....	40	7	13	12	1,359
Mechanics.....	646	3	19	3	1	.....	.....	.....	57	15	17	24	785
Clerks, traders, etc.....	163	1	13	2	1	.....	.....	1	12	5	16	12	226
Miners.....	84	.....	.....	.....	.....	.....	.....	1	8	1	.....	.....	94
Female servants.	323	15	10	16	6	4	3	2	80	17	21	43	540
Not classified....	205	.....	8	2	6	2	.....	.....	110	33	58	279	703
Totals.....	3,621	84	122	39	20	6	3	4	358	102	173	510	5,042
Maritime Provinces.....	451	50	74	18	6	1	.....	2	48	.....	8	8	666
Quebec.....	546	29	33	12	7	1	.....	.....	62	15	15	22	742
Ontario.....	1,334	5	14	7	6	4	3	1	129	49	71	273	1,896
Manitoba.....	399	.....	.....	2	1	.....	.....	.....	27	6	16	55	506
Saskatchewan....	375	.....	.....	.....	.....	.....	.....	.....	19	9	25	87	515
Alberta.....	312	.....	1	.....	.....	.....	.....	.....	44	9	19	39	424
British Columbia	204	.....	.....	.....	.....	.....	.....	1	29	14	19	26	293
Totals.....	3,621	84	122	39	20	6	3	4	358	102	173	510	5,042

TABLE V.—Nationality, Sex, Occupation and Destination of Immigrant Arrivals

	Sex.				Trade or								
					Farmers and Farm Labourers Class.			General Labourers			Mechanics.		
	Males.	Females.	Children.	Totals.	Males.	Females.	Children.	Males.	Females.	Children.	Males.	Females.	Children.
African, South	1	1		2									
Australian	1			1									
Austro-Hungarian—													
Austrian, N.E.S.	13	4	7	24		1	3	7		1	6	3	3
Bohemian	2			2				2					
Galician	4	1		5	1			3					
Ruthenian	2	2	1	5		1	1	2	1				
Belgian	109	40	41	190	24	8	7	40	8	9	25	5	7
Bermudian		1		1									
Bulgarian	125			125				125					
Dutch	24	12	7	43	13	2	3	7	1	2	3	4	2
French	49	22	10	81	30	4	2	3	1	2	12	8	3
German	39	26	13	78	23	16	13	8	1		4		
Great Britain and Ireland—													
English	1,181	1,019	762	2,962	548	180	210	206	99	99	255	133	134
Irish	131	97	47	275	62	16	19	19	11	15	20	12	10
Scotch	104	110	51	265	45	14	11	22	12	12	13	9	12
Welsh	31	13	6	50	19	3	1	2			2		
Greek	244	5		249	1			241	5				
Hebrew—													
Hebrew, N.E.S.	3	1	3	7							2	1	3
" Russian	22	18	24	64				6	2	5	14	11	14
Italian	108	6	9	123				107	2	3	1	2	6
Macedonian	1			1				1					
Maltese	1			1	1								
Montenegrin	2			2				2					
Negro	70	35	6	111	1			56	7	5	10	1	
New Zealand	1			1									
Polish—													
Polish, N.E.S.	3			3				2					
" Austrian	2			2				2					
" Russian	4		1	5				4		1			
Portuguese	3			3				1					
Roumanian		1		1									
Russian—													
Russian, N.E.S.	17	8	11	36				14	2	1	3	3	8
Finnish	13	1		14				13					
Scandinavian—													
Danish	21	5	2	28	9			7	1	2	4		
Norwegian	21	4		25	9	1		11					
Swedish	25	11	4	40	12	6	2	11	1	2	2		
Serbian	2			2				2					
Spanish	3			3	2			1					
Swiss	8	5	3	16	4	2	1	1			1		
Syrian	1			1									
West Indian	129	56	10	195	4			107	7	4	11	3	
Totals	2,520	1,504	1,018	5,042	808	254	273	1,035	161	163	388	195	202

for Canada, at the Port of St. John, for the Fiscal Year ended March 31, 1915.

Occupation.										Destination.						
Clerks, Traders, etc.			Miners.			Female Servants.	Not Classified.			Maritime Provinces.	Quebec.	Ontario.	Manitoba.	Saskatchewan.	Alberta.	British Columbia.
Males.	Females.	Children.	Males.	Females.	Children.		Males.	Females.	Children.							
							1	1			1			1		
							1					1				
										5		8	6	4		1
																2
						1						4	1			
												1	2	2		
1			18	14	18	3	1	2		50	43	17	66	3	3	8
						1				1						
										16	42	67				
1						4		1			1	3	4	15	18	2
			2	2	3	3	2	4		9	44	5	13	8	1	1
2			2			6		3		11	2	4	4	14	38	5
68	54	23	17	4	8	353	87	196	288	282	213	1,388	281	373	250	175
17	9		1			36	12	13	3	31	23	104	41	39	21	16
11	5	1	1			49	12	21	15	45	14	101	22	23	44	16
5	1	1	1			6	2	3	4	6	2	13	6	12	6	5
1							1			4	143	60		2	1	39
1											7					
	3	5	1			2	1			3	21	4	36			
						1		1		3	73	24	5		9	9
												1				
															1	
												2				
2						20	1	7	1	62	26	22	1			
			1							1						
			1								2	1				
											1		1			
											2	2			1	
2										3						
								1				1				
						1		2	2	3	13	8	1	10	1	
						1				1		12			1	
						4	1			3	3	1	2	2	16	1
						3	1			2		3	6	2	4	8
						4				15		10	4	4	2	5
												2				
										2	1					
1						2	2	1	2	2	5		2	1	6	
											1					
5	3	4				40	2	3	2	106	59	27	2		1	
117	75	34	45	20	29	540	127	259	317	666	742	1,896	506	515	424	293

PORT OF QUEBEC.

For the fiscal year 1914-15, there arrived at the port of Quebec 98,771 passengers, of whom 7,838 travelled saloon and 90,933 steerage. Of the saloon passengers, 4,827 were destined to Canada and 3,011 to the United States. Of the steerage passengers 76,359 were for Canada, and 14,574 for the United States. Included in the steerage passengers for Canada were 23,935 returned Canadians and 2,993 tourists, leaving the immigration proper at 49,431 souls, a decrease, at this port, as compared with the preceding fiscal year, of 108,505 persons.

Table I deals with the total arrivals of saloon passengers; Table II with the total arrivals of steerage passengers; Table III with the monthly arrivals of immigrants for Canada; and Tables IV and V give summaries of the information obtained from immigrants for Canada upon arrival.

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TABLE I.—Nationality and Sex of Saloon Passengers arriving at the Port of Quebec for the Fiscal Year ended March 31, 1915.

	Canada.				United States.				Canada and United States.			
	Males.	Females.	Children.	Totals.	Males.	Females.	Children.	Totals.	Males.	Females.	Children.	Totals.
African, South	.....	2	3	5	.....	.....	.....	.....	.....	2	3	5
Australian	1	3	1	5	2	2	.....	4	3	5	1	9
Austro-Hungarian—												
Austrian, N.E.S.	.....	.....	.....	.....	1	3	.....	4	1	3	.....	4
Croatian	.....	.....	.....	.....	.....	1	.....	1	.....	1	.....	1
Hungarian, N.E.S.	.....	.....	.....	.....	1	.....	.....	1	1	.....	.....	1
Magyar	.....	1	.....	1	.....	.....	.....	.....	.....	1	.....	1
Belgian	3	2	.....	5	.....	.....	.....	.....	3	2	.....	5
Chilian	.....	1	.....	1	.....	.....	.....	.....	.....	1	.....	1
Cuban	.....	.....	.....	.....	1	1	.....	2	1	1	.....	2
Dutch	2	.....	.....	2	1	1	.....	2	3	1	.....	4
French	2	3	.....	5	2	18	2	22	4	21	2	27
German	.....	4	.....	4	8	7	.....	15	8	11	.....	19
Great Britain and Ireland—												
English	89	110	25	224	103	80	10	193	192	190	35	417
Irish	6	9	.....	15	7	10	.....	17	13	19	.....	32
Scotch	23	28	5	56	19	15	1	35	42	43	6	91
Welsh	4	1	.....	5	4	1	.....	5	8	2	.....	10
Greek	.....	.....	.....	.....	.....	1	.....	1	.....	1	.....	1
Italian	.....	1	.....	1	.....	1	1	2	.....	2	1	3
Mexican	.....	.....	.....	.....	3	4	4	11	3	4	4	11
Russian—												
Russian, N.E.S.	.....	.....	.....	.....	3	3	.....	6	3	3	.....	6
Finnish	.....	.....	.....	.....	1	.....	.....	1	1	.....	.....	1
Scandinavian—												
Norwegian	1	.....	.....	1	.....	2	.....	2	1	2	.....	3
Swedish	1	1	.....	2	2	.....	.....	2	3	1	.....	4
Spanish	1	.....	.....	1	.....	.....	.....	.....	1	.....	.....	1
Swiss	.....	.....	.....	.....	3	5	1	9	3	5	1	9
U.S.A. Citizens	3	5	.....	8	943	1,439	160	2,542	946	1,444	160	2,550
Venezuelan	.....	.....	.....	.....	.....	1	.....	1	.....	1	.....	1
Returned Canadian	1,399	1,570	284	3,253	.....	.....	.....	.....	1,399	1,570	284	3,253
Tourist	661	507	65	1,233	68	59	6	133	729	566	71	1,366
Totals	2,196	2,248	383	4,827	1,172	1,654	185	3,011	3,368	3,902	568	7,838

TABLE II.—Nationality and Sex of Steerage Passengers arriving at the Port of Quebec, for the Fiscal Year ended March 31, 1915.

	Canada.				United States.				Canada and United States.			
	Males.	Females.	Children.	Totals.	Males.	Females.	Children.	Totals.	Males.	Females.	Children.	Totals.
African, South	5	2	3	10	3	1	6	10	8	3	9	20
Albanian	.....	2	2	4	12	.....	.....	12	12	2	2	16
Argentinian	2	1	2	5	.....	1	.....	1	2	2	2	6
Australian	14	8	2	24	6	6	.....	12	20	14	2	36
Austro-Hungarian—												
Austrian, N.E.S.	195	110	66	371	56	66	40	162	251	176	106	533
Bohemian	20	17	14	51	4	2	2	8	24	19	16	59
Bukowinian	14	4	3	21	.....	.....	.....	.....	14	4	3	21
Croatian	52	16	15	83	7	1	.....	8	59	17	15	91
Dalmatian	12	.....	.....	12	1	.....	.....	1	13	.....	.....	13
Galician	5	4	3	12	.....	2	5	7	5	6	8	19
Hungarian, N.E.S.	73	23	8	104	41	45	31	117	114	68	39	221
Magyar	50	12	20	82	11	12	9	32	61	24	29	114
Ruthenian	2,310	845	640	3,795	1	.....	.....	1	2,311	845	640	3,796
Slovak	11	.....	.....	11	1	.....	.....	1	12	.....	.....	12
Belgian	275	193	144	612	47	26	14	87	322	219	158	699
Bulgarian	2,081	15	14	2,110	18	3	4	25	2,099	18	18	2,135
Chinese	1	.....	.....	1	.....	.....	.....	.....	1	.....	.....	1
Dutch	153	76	75	304	52	31	18	101	205	107	93	405
French	407	223	103	733	31	20	14	65	438	243	117	798
German	553	287	344	1,184	152	134	53	339	705	421	397	1,523
Great Britain and Ireland—												
English	6,008	9,016	6,030	21,054	1,076	996	501	2,573	7,084	10,012	6,531	23,627
Irish	1,009	1,135	500	2,644	99	95	44	238	1,108	1,230	544	2,882
Scotch	1,884	3,249	1,748	6,881	408	451	234	1,093	2,292	3,700	1,982	7,974
Welsh	138	164	105	407	39	26	28	93	177	190	133	500
Greek	370	7	11	388	15	.....	.....	15	385	7	11	403
Hebrew—												
Hebrew, N.E.S.	78	41	63	182	8	2	6	16	86	43	69	198
" Austrian	29	45	25	99	2	2	2	6	31	47	27	105
" German	.....	.....	.....	.....	2	.....	.....	2	2	.....	.....	2
" Polish	2	2	1	5	.....	.....	.....	.....	2	2	1	5
" Russian	579	546	504	1,629	228	181	175	584	807	727	679	2,213
Italian	715	65	29	809	35	8	9	52	750	73	38	861
Japanese	.....	.....	.....	.....	2	1	.....	3	2	1	.....	3
Macedonian	112	.....	.....	112	.....	.....	.....	.....	112	.....	.....	112
Maltese	9	4	.....	13	1	.....	.....	1	10	4	.....	14
Mexican	.....	.....	.....	.....	1	.....	.....	1	1	.....	.....	1
Montenegrin	4	.....	.....	4	.....	.....	.....	.....	4	.....	.....	4
Negro	1	.....	.....	1	.....	.....	.....	.....	1	.....	.....	1
Newfoundland	1	1	.....	2	.....	.....	.....	.....	1	1	.....	2
New Zealand	6	1	.....	7	.....	.....	.....	.....	6	1	.....	7
Persian	3	.....	.....	3	18	.....	.....	18	21	.....	.....	21
Polish—												
Polish, N.E.S.	56	24	21	101	11	8	6	25	67	32	27	126
" Austrian	410	247	186	843	12	17	14	43	422	264	200	886
" German	6	.....	.....	6	7	1	1	9	13	1	1	15
" Russian	126	72	55	253	23	22	10	55	149	94	65	308
Portuguese	.....	.....	.....	.....	2	.....	.....	2	2	.....	.....	2
Roumanian	89	29	20	138	9	4	.....	13	98	33	20	151
Russian—												
Russian, N.E.S.	1,400	359	339	2,098	397	242	226	865	1,797	601	565	2,963
Finnish	191	111	55	357	361	236	132	729	552	347	187	1,086
Scandinavian—												
Danish	97	39	32	168	74	39	39	152	171	78	71	320
Icelandic	56	57	31	144	1	1	.....	2	57	58	31	146
Norwegian	290	150	82	522	536	250	63	849	826	400	145	1,371
Swedish	310	152	100	562	406	209	107	722	716	361	207	1,284
Serbian	142	4	1	147	4	1	1	6	146	5	2	153
Spanish	78	6	3	87	3	.....	.....	3	81	6	3	90

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TABLE II.—Nationality and Sex of Steerage Passengers arriving at the Port of Quebec, for the Fiscal Year ended March 31, 1915.—*Concluded.*

	Canada.				United States.				Canada and United States.			
	Males.	Females.	Children.	Totals.	Males.	Females.	Children.	Totals.	Males.	Females.	Children.	Totals.
Swiss	71	37	17	125	13	7	6	26	84	44	23	151
Turkish—												
Turkish, N.E.S.	11	1	1	13	5	1	1	7	16	2	2	20
Armenian	29	.....	.....	29	3	1	.....	4	32	1	.....	33
Syrian	28	13	5	46	5	2	2	9	33	15	7	55
U. S. A. Citizens	8	10	2	20	2,132	2,707	493	5,332	2,140	2,717	495	5,352
Venezuelan	.....	.....	.....	.....	1	.....	.....	1	1	.....	.....	1
West Indian	3	.....	.....	3	.....	.....	.....	.....	3	.....	.....	3
Total immigration	20,582	17,425	11,424	49,431	6,382	5,860	2,296	14,538	26,964	23,285	13,720	63,969
Returned Canadian	11,880	8,134	3,921	23,935	.....	.....	.....	.....	11,880	8,134	3,921	23,935
Tourist	1,534	1,335	124	2,993	16	20	.....	36	1,550	1,355	124	3,029
Totals	33,996	26,894	15,469	76,359	6,398	5,880	2,296	14,574	40,394	32,774	17,765	90,933

TABLE III.—Monthly arrivals of Immigrants for Canada, by Nationalities, at the Port of Quebec, for the Fiscal Year ended March 31, 1915.

—	April.	May.	June.	July.	Aug.	Sept	Oct.	Nov.	Totals.
African, South	.....	.....	.....	6	1	3	.....	.....	10
Albanian	.....	.....	.....	4	.....	.....	.....	.....	4
Argentinian	.....	.....	1	.....	2	.....	.....	2	5
Australian	8	1	3	7	1	2	1	1	24
Austro-Hungarian—									
Austrian, N.E.S.	2	119	169	57	22	1	1	.....	371
Bohemian	.....	28	18	4	1	.....	.....	.....	51
Bukowinian	.....	5	16	.....	.....	.....	.....	.....	21
Croatian	20	28	17	18	.....	.....	.....	.....	83
Dalmatian	.....	12	.....	.....	.....	.....	.....	.....	12
Galician	.....	.....	2	7	3	.....	.....	.....	12
Hungarian, N.E.S.	.....	18	68	18	.....	.....	.....	.....	104
Magyar	.....	59	19	4	.....	.....	.....	.....	82
Ruthenian	5	1,816	1,425	540	9	.....	.....	.....	3,795
Slovak	.....	1	10	.....	.....	.....	.....	.....	11
Belgian	107	216	110	128	22	14	4	11	612
Bulgarian	14	1,587	456	42	7	4	.....	.....	2,110
Chinese	.....	1	.....	.....	.....	.....	.....	.....	1
Dutch	31	119	33	64	44	5	6	2	304
French	175	201	124	153	37	27	11	5	733
German	50	571	214	295	47	4	3	.....	1,184
Great Britain and Ireland—									
English	874	7,134	4,082	3,482	1,921	1,742	919	900	21,054
Irish	153	868	597	373	234	179	160	80	2,644
Scotch	553	1,828	2,088	743	715	506	268	180	6,881
Welsh	25	135	77	60	31	40	13	26	407
Greek	28	130	125	91	13	1	.....	.....	388
Hebrew—									
Hebrew, N.E.S.	1	38	79	29	11	10	6	8	182
" Austrian	.....	24	37	30	8	.....	.....	.....	99
" Polish	1	2	1	1	.....	.....	.....	.....	5
" Russian	25	304	547	504	195	26	23	5	1,629
Italian	180	420	122	55	27	2	2	1	809
Macedonian	.....	29	40	31	12	.....	.....	.....	112
Maltese	2	.....	5	3	3	.....	.....	.....	13
Montenegrin	.....	2	1	1	.....	.....	.....	.....	4
Negro	.....	.....	.....	.....	.....	.....	1	.....	1
Newfoundland	.....	.....	2	.....	.....	.....	.....	.....	2
New Zealand	2	1	1	1	1	1	.....	.....	7
Persian	1	.....	.....	2	.....	.....	.....	.....	3
Polish—									
Polish, N.E.S.	1	55	40	4	1	.....	.....	.....	101
" Austrian	.....	479	237	111	16	.....	.....	.....	843
" German	1	4	.....	1	.....	.....	.....	.....	6
" Russian	.....	96	75	53	10	11	.....	8	253
Roumanian	1	93	18	20	6	.....	.....	.....	138
Russian—									
Russian, N.E.S.	23	932	698	319	102	14	9	1	2,098
Finnish	1	148	94	87	24	2	1	.....	357
Scandinavian—									
Danish	7	74	33	28	12	2	11	1	168
Icelandic	.....	24	70	45	4	1	.....	.....	144
Norwegian	4	124	112	114	73	53	34	8	522
Swedish	.....	226	132	114	39	24	18	9	562
Serbian	2	35	55	48	7	.....	.....	.....	147
Spanish	31	28	20	6	2	.....	.....	.....	87
Swiss	13	49	42	7	8	2	1	3	125
Turkish—									
Turkish, N.E.S.	.....	7	.....	3	.....	2	.....	1	13
Armenian	9	6	.....	3	6	5	.....	.....	29
Syrian	8	10	14	7	6	1	.....	.....	46
U. S. A. Citizens	.....	4	2	6	2	2	2	2	20
West Indian	.....	.....	2	1	.....	.....	.....	.....	3
Totals	2,358	18,091	12,133	7,730	3,685	2,686	1,494	1,254	49,431

TABLE IV.—Monthly arrivals of Immigrants for Canada, by Occupation and Destination, at the Port of Quebec, for the Fiscal Year ended March 31, 1915.

——	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Totals.
Agriculturists	739	4,614	3,049	1,792	563	239	205	202	11,403
General labourers	532	6,170	3,095	1,568	589	264	137	148	12,503
Mechanics	491	3,010	2,106	1,481	829	545	257	220	8,939
Clerks, traders, etc	115	837	620	414	345	232	85	72	2,720
Miners	22	221	169	147	55	50	49	15	728
Female servants	242	1,661	1,525	963	499	498	337	243	5,968
Not classified	217	1,578	1,569	1,365	805	858	424	354	7,170
Totals	2,358	18,091	12,133	7,730	3,685	2,686	1,494	1,254	49,431
Maritime Provinces	36	301	230	155	94	59	22	23	920
Quebec	581	4,694	2,670	1,603	748	564	305	279	11,444
Ontario	926	7,113	4,798	3,076	1,550	1,310	549	536	19,858
Manitoba	312	2,132	1,603	972	429	183	141	102	5,874
Saskatchewan	176	1,421	1,183	862	288	174	132	110	4,346
Alberta	197	1,608	1,005	610	289	182	139	93	4,123
British Columbia	130	822	643	452	287	214	206	111	2,865
Yukon Territory	.....	.....	1	.....	.....	.....	.....	.....	1
Totals	2,358	18,091	12,133	7,730	3,685	2,686	1,494	1,254	49,431

TABLE V.—Nationality, Sex, Occupation and Destination of Immigrant Arrivals

—	Sex.				Trade or								
					Farmers and Farm Labourers Class.			General Labourers.			Mechanics.		
	Males.	Females.	Children.	Totals.	Males.	Females.	Children.	Males.	Females.	Children.	Males.	Females.	Children.
African, South	5	2	3	10	2	1	.....	.....	.....	.....	2	1	3
Albanian	.....	2	2	4	.....	.....	.....	.....	2	2	.....	.....	.....
Argentinian	2	1	2	5	.....	.....	.....	.....	.....	.....	1	1	.....
Australian	14	8	2	24	3	.....	.....	1	1	1	5	2	1
Austro-Hungarian-													
Austrian, N.E.S.	195	110	66	371	44	18	25	129	37	30	12	10	6
Bohemian	20	17	14	51	5	6	11	5	2	1	2	.....	.....
Bukowinian	14	4	3	21	7	4	3	7	.....	.....	.....	.....	.....
Croatian	52	16	15	83	11	6	10	37	8	5	2	.....	.....
Dalmatian	12	.....	.....	12	.....	.....	.....	12	.....	.....	.....	.....	.....
Galician	5	4	3	12	1	2	1	4	.....	1	.....	1	.....
Hungarian, N.E.S	73	23	8	104	28	6	4	40	7	3	4	2	1
Magyar	50	12	20	82	19	6	9	25	5	10	1	1	.....
Ruthenian	2,310	845	640	3,795	876	336	395	1,415	279	215	9	1	1
Slovak	11	.....	.....	11	3	.....	.....	8	.....	.....	.....	.....	.....
Belgian	275	193	144	612	79	36	40	64	24	29	83	51	39
Bulgarian	2,081	15	14	2,110	108	.....	1	1,961	10	11	8	3	2
Chinese	1	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....
Dutch	153	76	75	304	72	20	44	24	6	5	39	11	13
French	407	223	103	733	203	56	46	54	7	1	76	44	25
German	553	287	344	1,184	258	118	189	126	41	73	91	28	40
Great Britain and Ireland—													
English	6,008	9,016	6,030	21,054	2,315	1,006	1,047	853	887	1,042	1,342	1,843	1,631
Irish	1,009	1,135	500	2,644	516	96	93	148	89	109	119	134	124
Scotch	1,884	3,249	1,748	6,881	606	198	218	263	254	326	472	588	576
Welsh	138	164	105	407	56	12	21	14	14	27	28	32	21
Greek	370	7	11	388	26	.....	.....	327	5	10	4	1	.....
Hebrew—													
Hebrew, N.E.S.	78	41	63	182	4	.....	.....	20	7	16	28	18	28
" Austrian	29	45	25	99	4	.....	.....	7	17	11	8	14	12
" Polish	2	2	1	5	.....	.....	.....	1	.....	.....	.....	1	.....
" Russian	579	546	504	1,629	30	17	25	96	43	44	320	254	246
Italian	715	65	29	809	43	3	1	601	20	10	31	9	3
Macedonian	112	.....	.....	112	7	.....	.....	104	.....	.....	1	.....	.....
Maltese	9	4	.....	13	3	.....	.....	3	.....	.....	2	2	.....
Montenegrin	4	.....	.....	4	1	.....	.....	3	.....	.....	.....	.....	.....
Negro	1	.....	.....	1	.....	.....	.....	1	.....	.....	.....	.....	.....
Newfoundland	1	1	.....	2	.....	.....	.....	.....	.....	.....	1	.....	.....
New Zealand	6	1	.....	7	3	.....	.....	.....	1	.....	2	.....	.....
Persian	3	.....	.....	3	.....	.....	.....	3	.....	.....	.....	.....	.....
Polish—													
Polish, N.E.S.	56	24	21	101	17	7	7	31	7	7	5	2	3
" Austrian	410	247	186	843	184	60	96	185	63	59	34	13	9
" German	6	.....	.....	6	5	.....	.....	.....	.....	.....	.....	.....	.....
" Russian	126	72	55	253	16	4	9	93	22	20	9	3	1
Roumanian	89	29	20	138	25	8	9	52	12	7	8	2	2
Russian—													
Russian, N.E.S.	1,400	359	339	2,098	406	123	198	911	75	69	50	32	25
Finnish	191	111	55	357	19	10	16	150	24	21	10	7	7
Scandinavian—													
Danish	97	39	32	168	30	7	7	36	11	7	20	5	12
Icelandic	56	57	31	144	20	12	12	23	5	8	7	5	1
Norwegian	290	150	82	522	164	32	39	77	12	21	31	13	10
Swedish	310	152	100	562	155	37	53	104	16	16	34	11	14
Serbian	142	4	1	147	11	.....	.....	130	3	1	1	.....	.....
Spanish	78	6	3	87	9	1	.....	57	1	2	5	2	.....
Swiss	71	37	17	125	36	6	7	11	3	3	17	3	.....

for Canada, at the Port of Quebec, for the Fiscal Year ended March 31, 1915.

Occupation.										Destination.							
Clerks, Traders, etc.			Miners.			Female Servants.	Not Classified.			Maritime Provinces.	Quebec.	Ontario.	Manitoba.	Saskatchewan.	Alberta.	British Columbia.	Yukon Territory.
Males.	Females.	Children.	Males.	Females.	Children.		Males.	Females.	Children.								
							1					6			4		
											4						
			1						2		3				2		
1						2	4	3		1	8	6	4		1	4	
4						40	6	5	5		155	67	60	65	16	8	
1			7	2	2	6		1		8	8	11	10	2	5	7	
											2	6	8	5			
1			1			2					5	36		19	11	12	
												12					
						1			1		1	2	3	3	3		
						8	1			3	8	52	8	24	6	3	
			5						1	2	8	31	10	28	2	1	
	1	1	8	2	3	205	2	21	25	25	827	870	993	461	581	38	
												5	2		1	3	
6	1	2	31	16	13	33	12	32	21	61	348	27	83	38	48	7	
2						1	2	1		74	863	1,128	1	22	22		
							1					1					
12	2	5				19	6	18	8	40	62	47	48	34	60	13	
18	11	6	10	6	8	33	46	66	17	24	422	71	81	60	54	21	
32	6	2	12	7	16	57	34	30	24	29	199	135	184	341	270	26	
500	534	287	133	57	88	3,041	865	1,648	1,935	299	3,596	10,828	1,642	1,654	1,468	1,566	1
115	79	44	8			531	103	206	130	35	514	1,282	346	151	172	144	
219	298	130	65	46	68	1,360	199	505	430	172	1,377	2,700	918	466	661	587	
7	6	6	10	3	4	63	23	34	26	16	73	130	41	24	67	56	
4		1	3			1	6			2	154	204	4	3	1	20	
21	8	11				3	5	5	8		126	33	18	1	4		
9	6					6	1	2	2		70	18	8	2	1		
1								1	1		2	3					
84	70	65	1	1		53	48	108	124	14	726	460	355	44	23	7	
9	3	2	10	2	5	13	21	15	8	28	430	233	31	1	30	56	
										5	16	88	1		2		
1	2										6	6	1				
											1	1			1	1	
											1						
						1					2						
1											2	4			1		
												3					
			3			4		4	4	1	15	28	15	25	15	2	
1			2	2	6	99	4	10	16	8	128	165	297	105	132	8	
							1					1	5				
	2	4	3			28	5	13	21	11	118	62	41	6	13	2	
3	1	1	1			5		1	1		64	31	7	27	9		
14	11	10	5	2		87	14	29	37	30	698	432	282	365	202	89	
1	1		10	5	5	57	1	7	6		31	261	7	14	16	28	
3	3	6				12	8	1		15	63	31	33	11	12	3	
3	1					27	3	7	10		1		122	13	1	7	
3			3			79	12	14	12	6	47	68	71	176	95	59	
	2		11	1	4	73	6	12	13		56	93	101	131	99	82	
						1				2	30	113			1	1	
			5	2	1		2			2	75	3	5	1	1		
2				1	1	13	5	11	6	2	55	14	23	22	6	3	

TABLE V.—Nationality, Sex, Occupation and Destination of Immigrant Arrivals for

—	Sex.				Trade or								
					Farmers and Farm Labourers Class.			General Labourers.			Mechanics.		
	Males.	Females.	Children.	Totals.	Males.	Females.	Children.	Males.	Females.	Children.	Males.	Females.	Children.
Turkish—													
Turkish, N.E.S..	11	1	1	13	5	.....	.....	2	.....	.....	2	1	1
Armenian.....	29	.....	.....	29	3	.....	.....	20	.....	.....	2	.....	.....
Syrian.....	28	13	5	46	7	3	1	14	5	1	.....	.....	.....
U.S.A. Citizens....	8	10	2	20	2	.....	2	1	.....	.....	1	2	.....
West Indian.....	3	.....	.....	3	.....	.....	.....	1	.....	.....	.....	.....	.....
Totals.....	20,582	17,425	11,424	49,431	6,507	2,257	2,639	8,254	2,025	2,224	2,929	3,153	2,857

Canada, at the Port of Quebec, for the Fiscal Year ended March 31, 1915.—*Concluded.*

Occupation.											Destination.						
Clerks, Traders, etc.			Miners.			Female Servants.	Not Classified.			Maritime Provinces.	Quebec.	Ontario.	Manitoba.	Saskatchewan.	Alberta.	British Columbia.	Yukon Territory.
Males.	Females.	Children.	Males.	Females.	Children.		Males.	Females.	Children.								
12	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	4	9	.....	.....	.....	.....	..
1	.....	.....	.....	.....	.....	.....	3	.....	.....	3	3	21	.....	.....	.....	.....	..
2	1	.....	.....	.....	.....	1	5	3	3	.....	27	14	3	.....	2	.....	..
3	1	.....	.....	1	.....	3	1	3	.....	1	6	6	2	2	2	1	..
1	.....	.....	.....	.....	.....	.....	1	.....	.....	1	2	.....	.....	.....	.....	.....	..
1,087	1,050	583	348	156	224	5,968	1,457	2,816	2,897	920	11,444	19,858	5,874	4,346	4,123	2,865	1

PORT OF VANCOUVER.

For the fiscal year 1914-15, there arrived at the Port of Vancouver 6,139 passengers, of whom 1,479 travelled saloon and 4,660 steerage. Of the saloon passengers, 1,115 were destined to Canada and 364 to the United States. Of the steerage passengers, 4,039 were for Canada, and 621 for the United States. Included in the steerage passengers for Canada were 1,489 returned Canadians and 1,393 tourists, leaving the immigration proper at 1,157 souls, a decrease at this port, as compared with the preceding fiscal year, of 1,723 persons.

Table I deals with the total arrivals of saloon passengers; Table II with the total arrivals of steerage passengers; Table III with the monthly arrivals of immigrants for Canada; and Tables IV and V give summaries of the information obtained from immigrants for Canada upon arrival.

TABLE I.—Nationality and Sex of Saloon Passengers arriving at the Port of Vancouver, for the Fiscal Year ended March 31, 1915.

—	CANADA.				UNITED STATES.				CANADA AND UNITED STATES.			
	Males.	Females.	Children.	Totals.	Males.	Females.	Children.	Totals.	Males.	Females.	Children.	Totals.
Australian	1			1		1		1	1	1		2
Austrian		1		1						1		1
Dutch					2	5	3	10	2	5	3	10
French					1	2		3	1	2		3
German	1	1		2	9	5	2	16	10	6	2	18
Great Britain and Ireland—												
English	5	4	9	18	56	36	11	103	61	40	20	121
Irish		2		2	6	4		10	6	6		12
Scotch	1	2		3	13	10	1	24	14	12	1	27
Hebrew, Russian					1			1	1			1
Italian						1		1		1		1
Japanese	1	3		4	4	2		6	5	5		10
New Zealand					2	1		3	2	1		3
Polish					1			1	1			1
Russian					1			1	1			1
Scandinavian—												
Danish					1	1	2	4	1	1	2	4
Norwegian					2	1		3	2	1		3
Swedish						1		1		1		1
Spanish					1			1	1			1
Swiss						1		1		1		1
U.S.A. Citizens	2			2	67	76	12	155	69	76	12	157
Returned Canadian	87	66	13	166					87	66	13	166
Tourist	525	345	46	916	11	7	1	19	536	352	47	935
Totals	623	424	68	1,115	178	154	32	364	801	578	100	1,479

TABLE II.—Nationality and Sex of Steerage Passengers arriving at the Port of Vancouver, for the Fiscal Year ended March 31, 1915.

—	Canada.				United States.				Canada and United States.			
	Males.	Females.	Children.	Totals.	Males.	Females.	Children.	Totals.	Males.	Females.	Children.	Totals.
Australian	7	8	6	21	14	9	6	29	21	17	12	50
Austrian	1			1		2		2	1	2		3
Chinese	759	19	43	821	110	3	1	114	869	22	44	935
Dutch	1			1	4			4	5			5
French					2			2	2			2
German	6			6	6	3	1	10	12	3	1	16
Great Britain and Ireland—												
English	119	46	19	184	88	45	18	151	207	91	37	335
Irish	13	6	1	20	18	10	1	29	31	16	2	49
Scotch	38	20	3	61	34	17	9	60	72	37	12	121
Welsh	8	2		10	1			1	9	2		11
Hebrew						1		1		1		1
Italian	2			2	3			3	5			5
Japanese	5	3		8	57	10	1	68	62	13	1	76
Maltese	1			1					1			1
New Zealand	6	2		8	7	4	2	13	13	6	2	21
Polish	1			1	1			1	2			2
Russian—												
Russian, N.E.S.	6	1		7	4			4	10	1		11
Finnish					3			3	3			3
Scandinavian—												
Danish	2			2	5	2	1	8	7	2	1	10
Norwegian					2	2		4	2	2		4
Swedish	2			2	3	1	2	6	5	1	2	8
Swiss					4			4	4			4
U.S.A. Citizens		1		1	49	21	6	76	49	22	6	77
West Indian					2			2	2			2
Total immigration	977	108	72	1,157	417	130	48	595	1,394	238	120	1,752
Returned Canadian	1,332	84	73	1,489					1,332	84	73	1,489
Tourist	1,155	153	85	1,393	22	2	2	26	1,177	155	87	1,419
Totals	3,464	345	230	4,039	439	132	50	621	3,903	477	280	4,660

TABLE III.—Monthly arrivals of Immigrants for Canada, by Nationalities, at the Port of Vancouver, for the Fiscal Year ended March 31, 1915.

——	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Totals.
Australian	3		2	9		1	4		1			1	21
Austrian	1												1
Chinese	267	247	279	8	17	3							821
Dutch			1										1
German	2	3				1							6
Great Britain and Ireland—													
English	110	23	8	17	11		3		1	3	2	6	184
Irish	14	5	1										20
Scotch	28	9	5	9	4				1		3	2	61
Welsh	2	1		2				3				2	10
Italian	2												2
Japanese	2	3		2	1								8
Maltese	1												1
New Zealand	3		4					1					8
Polish		1											1
Russian	2			4					1				7
Scandinavian—													
Danish	1										1		2
Swedish	1											1	2
U.S.A. Citizens			1										1
Totals	439	292	301	51	33	5	7	4	4	3	6	12	1,157

TABLE IV.—Monthly arrivals of Immigrants for Canada, by Occupation and Destination, at the Port of Vancouver, for the Fiscal Year ended March 31, 1915.

——	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Totals.
Agriculturists..	29	7	4	8	2	.....	4	.....	.....	.....	2	8	64
General labourers.....	259	166	257	6	.....	.....	.....	.....	1	.....	.....	.....	689
Mechanics.....	40	14	5	4	1	.....	.....	.....	1	1	1	2	69
Clerks, traders, etc.....	71	82	17	14	18	5	.....	.....	.....	.....	1	.....	208
Miners.....	11	2	.....	6	.....	.....	.....	.....	.....	.....	.....	.....	19
Female servants	1	2	.....	1	4	.....	.....	.....	.....	.....	2	1	11
Not classified..	28	19	18	12	8	.....	3	4	2	2	.....	1	97
Totals.....	439	292	301	51	33	5	7	4	4	3	6	12	1,157
Maritime Provinces.....	1	4	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	5
Quebec.....	53	51	51	6	3	2	.....	.....	.....	.....	2	.....	168
Ontario.....	66	48	52	1	5	.....	5	3	1	1	.....	1	183
Manitoba.....	7	11	6	4	1	.....	.....	.....	1	1	.....	.....	31
Saskatchewan.	3	4	1	6	1	.....	.....	.....	.....	.....	1	2	18
Alberta.....	36	9	14	10	8	2	2	.....	1	.....	3	8	93
British Columbia.....	273	165	177	24	15	1	.....	1	1	1	.....	1	659
Totals.....	439	292	301	51	33	5	7	4	4	3	6	12	1,157

TABLE V.—Nationality, Sex, Occupation and Destination of Immigrant Arrivals for

—	Sex.				Trade or								
					Farmers and Farm Labourers Class.			General Labourers.			Mechanics.		
	Males.	Females.	Children.	Totals.	Males.	Females.	Children.	Males.	Females.	Children.	Males.	Females.	Children.
Australian	7	8	6	21	1	1	2	2	.....	.....	1	1	....
Austrian	1	.....	.....	1	.....	.....	.....	.....	.....	.....	1	.....	....
Chinese	759	19	43	821	.....	.....	.....	594	4	5	....	.....	....
Dutch	1	.....	.....	1	1	.....	.....	.....	.....	.....	.....	.....	....
German	6	.....	.....	6	2	.....	.....	1	.....	.....	2	.....	....
Great Britain and Ireland—													
English	119	46	19	184	24	3	5	51	11	4	28	9	6
Irish	13	6	1	20	1	1	.....	3	1	.....	4	.....	....
Scotch	38	20	3	61	8	2	3	6	1	.....	10	1	....
Welsh	8	2	.....	10	1	1	.....	3	.....	.....	.....	.....	....
Italian	2	.....	.....	2	.....	.....	.....	.....	.....	.....	.....	.....	....
Japanese	5	3	.....	8	.....	.....	.....	.....	.....	.....	.....	.....	....
Maltese	1	.....	.....	1	.....	.....	.....	1	.....	.....	.....	.....	....
New Zealand	6	2	.....	8	1	.....	.....	.....	.....	.....	3	1	....
Polish	1	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	....
Russian	6	1	.....	7	4	.....	.....	1	.....	.....	1	1	....
Scandinavian—													
Danish	2	.....	.....	2	2	.....	.....	.....	.....	.....	.....	.....	....
Swedish	2	.....	.....	2	1	.....	.....	1	.....	.....	.....	.....	....
U.S.A. Citizens	.....	1	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	....
Totals	977	108	72	1,157	46	8	10	663	17	9	50	13	6

Canada, at the Port of Vancouver, for the Fiscal Year ended March 31, 1915.

Occupation.										Destination.						
Clerks, Traders, etc.			Miners.			Female Servants.	Not Classified.			Maritime Provinces.	Quebec.	Ontario.	Manitoba.	Saskatchewan.	Alberta.	British Columbia.
Males.	Females.	Children.	Males.	Females.	Children.		Males.	Females.	Children.							
3	2	1	.....	.....	.....	.....	.....	4	3	.....	2	7	....	4	2	6
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1
147	15	24	.....	.....	.....	.....	18	.....	14	5	156	161	17	5	19	458
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1
1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	....	....	....	2	3
2	1	.....	5	1	1	6	9	15	3	.....	2	10	6	4	52	110
1	.....	.....	2	.....	.....	.....	2	4	1	.....	4	....	....	1	1	14
3	1	.....	7	.....	.....	5	4	10	.....	.....	3	2	3	4	8	41
.....	.....	.....	1	.....	.....	.....	3	1	.....	.....	.....	3	1	....	3	3
.....	.....	.....	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2
4	1	.....	.....	.....	.....	.....	1	2	.....	.....	.....	.....	.....	.....	1	7
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1
1	.....	.....	.....	.....	.....	.....	1	1	.....	.....	.....	.....	.....	.....	2	6
1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	4	.....	.....	3
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	1
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	1
.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	1	....
163	20	25	17	1	1	11	38	38	21	5	168	183	31	18	93	659

PORT OF VICTORIA.

For the fiscal year 1914-15, there arrived at the Port of Victoria 5,457 passengers of whom 548 travelled saloon and 4,909 steerage. Of the saloon passengers, 397 were destined to Canada and 151 to the United States. Of the steerage passengers, 4,751 were for Canada and 158 for the United States. Included in the steerage passengers for Canada were 3,653 returned Canadians and 52 tourists, leaving the immigration proper at 1,046 souls, a decrease at this port as compared with the preceding fiscal year of 3,454 persons.

Table I deals with the total arrivals of saloon passengers; Table II with the total arrivals of steerage passengers; Table III with the monthly arrivals of immigrants for Canada; and Tables IV and V give summaries of the information obtained from immigrants for Canada upon arrival.

TABLE I.—Nationality and Sex of Saloon Passengers arriving at the Port of Victoria, for the Fiscal Year ended March 31, 1915.

—	Canada.				United States.				Canada and United States.			
	Males.	Females.	Children.	Totals.	Males.	Females.	Children.	Totals.	Males.	Females.	Children.	Totals.
Australian	6	3	.....	9	1	1	.....	2	7	4	.....	11
Austrian	.....	.....	.....	.....	2	1	.....	3	2	1	.....	3
Chinese	1	1	1	3	.....	.....	.....	.....	1	1	1	3
Dutch	.....	.....	.....	.....	1	2	.....	3	1	2	.....	3
German	.....	1	.....	1	1	5	.....	6	1	6	.....	7
Great Britain and Ireland—												
English	3	3	1	7	10	10	6	26	13	13	7	33
Irish	1	.....	.....	1	5	3	.....	8	6	3	.....	9
Scotch	.....	2	1	3	7	3	1	11	7	5	2	14
Japanese	6	5	1	12	1	3	2	6	7	8	3	18
Syrian	.....	.....	.....	.....	1	.....	.....	1	1	.....	.....	1
U.S.A. Citizens	.....	.....	.....	.....	38	28	16	82	38	28	16	82
Returned Canadian	54	42	16	112	.....	.....	.....	.....	54	42	16	112
Tourist	134	98	17	249	3	.....	.....	3	137	98	17	252
Totals	205	155	37	397	70	56	25	151	275	211	62	548

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TABLE II.—Nationality and Sex of Steerage Passengers arriving at the Port of Victoria, for the Fiscal Year ended March 31, 1915.

—	CANADA.				UNITED STATES.				CANADA AND UNITED STATES.			
	Males.	Females.	Children.	Totals.	Males.	Females.	Children.	Totals.	Males.	Females.	Children.	Totals.
Australian	.....	1	.....	1	8	6	.....	14	8	7	.....	15
Austrian	.....	.....	.....	.....	2	.....	.....	2	2	.....	.....	2
Chinese	387	21	28	436	.....	.....	.....	.....	387	21	28	436
French	.....	.....	.....	.....	1	1	.....	2	1	1	.....	2
German	.....	.....	.....	.....	4	3	2	9	4	3	2	9
Great Britain and Ireland—												
English	8	4	3	15	21	9	3	33	29	13	6	48
Irish	4	.....	.....	4	8	4	1	13	12	4	1	17
Scotch	3	1	1	5	.....	1	1	2	3	2	2	7
Welsh	1	.....	.....	1	1	.....	.....	1	2	.....	.....	2
Greek	.....	.....	.....	.....	1	.....	.....	1	1	.....	.....	1
Hawaiian	.....	.....	.....	.....	.....	1	.....	1	.....	1	.....	1
Italian	.....	.....	.....	.....	1	.....	.....	1	1	.....	.....	1
Japanese	186	355	43	584	8	4	.....	12	194	359	43	596
New Zealand	.....	.....	.....	.....	1	1	.....	2	1	1	.....	2
Russian	.....	.....	.....	.....	8	2	3	13	8	2	3	13
Scandinavian—												
Danish	.....	.....	.....	.....	3	.....	.....	3	3	.....	.....	3
Norwegian	.....	.....	.....	.....	1	.....	.....	1	1	.....	.....	1
Swedish	.....	.....	.....	.....	.....	1	.....	1	.....	1	.....	1
Swiss	.....	.....	.....	.....	2	.....	.....	2	2	.....	.....	2
Syrian	.....	.....	.....	.....	1	.....	1	2	1	.....	1	2
U.S.A. Citizens	.....	.....	.....	.....	28	12	2	42	28	12	2	42
Total immigration	589	382	75	1,046	99	45	13	157	688	427	88	1,203
Returned Canadian	3,476	114	63	3,653	.....	.....	.....	.....	3,476	114	63	3,653
Tourist	33	16	3	52	1	.....	.....	1	34	16	3	53
Totals	4,098	512	141	4,751	100	45	13	158	4,198	557	154	4,909

TABLE III.—Monthly arrivals of Immigrants for Canada, by Nationalities, at the Port of Victoria, for the Fiscal Year ended March 31, 1915.

——	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Totals.
Australian	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	1
Chinese	162	194	16	8	12	2	11	11	10	.....	10	.....	436
Great Britain and Ireland—													
English	1	5	.....	3	.....	.....	1	.....	.....	2	3	.....	15
Irish	.....	.....	1	2	.....	.....	.....	1	.....	.....	.....	.....	4
Scotch	1	.....	.....	.....	1	.....	.....	.....	3	.....	.....	.....	5
Welsh	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1
Japanese	117	110	99	58	61	22	30	16	26	11	13	21	584
Totals	281	310	117	71	74	24	42	28	39	13	26	21	1,046

TABLE IV.—Monthly arrivals of Immigrants for Canada, by Occupation and Destination, at the Port of Victoria, for the Fiscal Year ended March 31, 1915.

——	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Totals.
Agriculturists....	5	.....	14	10	17	7	6	4	6	1	4	6	80
General labourers..	178	219	29	6	6	.....	3	3	1	.....	1	.....	446
Mechanics.....	6	5	6	1	2	.....	.....	.....	2	.....	.....	.....	22
Clerks, traders, etc.	83	72	6	7	13	2	6	5	4	.....	5	1	204
Miners.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	1
Female servants.	.....	.....	.....	.....	2	.....	.....	1	.....	.....	1	.....	4
Not classified....	9	14	62	47	33	15	27	15	26	12	15	14	289
Totals.....	281	310	117	71	74	24	42	28	39	13	26	21	1,046
Quebec.....	4	4	.....	.....	.....	.....	.....	.....	2	.....	.....	.....	10
Ontario.....	4	10	.....	1	2	.....	1	.....	.....	.....	6	.....	24
Manitoba.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	1	2
Saskatchewan....	.....	.....	.....	.....	.....	1	.....	.....	1	.....	.....	.....	2
Alberta.....	.....	.....	.....	.....	1	.....	1	1	1	.....	.....	.....	4
British Columbia	273	296	116	69	70	23	40	27	35	13	20	20	1,002
Yukon Territory	.....	.....	1	.....	1	.....	.....	.....	.....	.....	.....	.....	2
Totals.....	281	310	117	71	74	24	42	28	39	13	26	21	1,046

TABLE V.—Nationality, Sex, Occupation, and Destination of Immigrant arrivals for

	Sex.				Trade or								
					Farmers and Farm Labourers Class.			General Labourers.			Mechanics.		
	Males.	Females.	Children.	Totals.	Males.	Females.	Children.	Males.	Females.	Children.	Males.	Females.	Children.
Australian	.....	1	.....	1	.....	.....	.....	.....	.....	.....	....	1	....
Chinese	387	21	28	436	.....	.....	.....	194	1	.....	1	....	....
Great Britain and Ireland—													
English	8	4	3	15	3	2	2	.....	.....	.....	3	1	1
Irish	4	.....	.....	4	2	.....	.....	.....	.....	.....	....	....	....
Scotch	3	1	1	5	1	1	1	1	.....	.....	....	....	....
Welsh	1	.....	.....	1	.....	.....	.....	1	.....	.....	....	....	....
Japanese	186	355	43	584	46	20	2	87	141	21	4	10	1
Totals	589	382	75	1,046	52	23	5	283	142	21	8	12	2

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Canada, at the Port of Victoria, for the Fiscal Year ended March 31, 1915.

Occupation.										Destination.						
Clerks, Traders, etc.			Miners.			Female Servants.	Not Classified.			Quebec.	Ontario.	Manitoba.	Saskatchewan.	Alberta.	British Columbia.	Yukon Territory.
Males.	Females.	Children.	Males.	Females.	Children.		Males.	Females.	Children.							
.....	.....	.....	....	....	....	....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....
162	12	10	....	....	....	....	30	8	18	10	19	1	.....	1	405	.....
.....	.....	.....	....	....	....	....	2	1	.....	.....	1	.....	.....	.....	14	.....
.....	.....	.....	....	....	....	....	2	.....	.....	.....	.....	.....	.....	.....	4	.....
1	.....	.....	....	....	....	....	.....	.....	.....	.....	.....	.....	.....	.....	5	.....
.....	.....	.....	....	....	....	....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....
... 12	7	.....	1	....	....	4	36	173	19	.....	4	1	2	3	572	2
...175	19	10	1	....	....	4	70	182	37	10	24	2	2	4	1,002	2

UNITED STATES PORTS.

For the fiscal year 1914-15, there arrived in Canada, via ports in the United States, 23,858 passengers, of whom 2,756 travelled saloon and 21,102 steerage. Included in the steerage passengers were 6,827 returned Canadians and 235 tourists, leaving the immigration proper at 14,040 souls, a decrease as compared with the preceding fiscal year of 28,914 persons.

Table I deals with the total arrivals of saloon passengers: Table II with the total arrivals of steerage passengers; Table III with the monthly arrivals of immigrants; and Tables IV and V give summaries of the information obtained from immigrants upon arrival.

TABLE I.—Nationality and Sex of Saloon Passengers for Canada, arriving at Ports in the United States, for the Fiscal Year ended March 31, 1915.

—	CANADA.			
	Males.	Females.	Children.	Totals.
African, South	2			2
Hungarian	2			2
Belgian		2	1	3
Bermudan	1			1
Cuban	1			1
Dutch	5	3	3	11
French	23	5		28
German	12	9	5	26
Great Britain and Ireland—				
English	24	28	10	62
Irish	9	4	1	14
Scotch	15	8		23
Greek	6	1		7
Italian	13	2		15
Jamaican	1	1		2
Russian	3			3
Scandinavian—				
Danish	3	3		6
Norwegian	4	4	1	9
Swedish	1			1
Spanish		1		1
Swiss		1		1
Turkish	3			3
U. S. A. Citizens	2	3		5
West Indian	2	1		3
Returned Canadian	1,211	799	119	2,129
Tourist	285	99	14	398
Totals	1,628	974	154	2,756

TABLE II.—Nationality and Sex of Steerage Passengers for Canada, via Ports in the United States, for the Fiscal Year ended March 31, 1915.

	CANADA.			
	Males.	Females.	Children.	Totals.
African, South	6	1	1	8
Australian	3	1	.....	4
Austro-Hungarian—				
Austrian, N.E.S.	26	15	11	52
Bohemian	13	4	3	20
Bukowinian	2	2	.....	4
Croatian	25	10	6	41
Galician	1	1	.....	2
Hungarian, N.E.S.	36	28	27	91
Magyar	25	13	9	47
Ruthenian	313	120	69	502
Slovak	5	5	5	15
Belgian	120	54	42	216
Bermudan	1	1	1	3
Bulgarian	986	3	4	993
Cuban	1	.....	.....	1
Dutch	68	59	61	188
French	79	57	19	155
German	347	196	138	681
Great Britain and Ireland—				
English	978	778	435	2,191
Irish	113	91	26	230
Scotch	72	117	16	205
Welsh	9	14	2	25
Greek	223	71	31	325
Hawaiian	16	1	1	18
Hebrew—				
Hebrew, N.E.S.	21	19	10	50
" Austrian	16	17	17	50
" Russian	139	121	135	395
Italian	4,062	558	339	4,959
Jamaican	4	14	3	21
Macedonian	18	1	.....	19
Montenegrin	.....	1	1	2
Negro	27	28	1	56
New Zealand	.....	1	2	3
Polish—				
Polish, N.E.S.	8	4	3	15
" Austrian	80	46	34	160
" Russian	100	36	29	165
Portuguese	4	1	.....	5
Roumanian	52	10	4	66
Russian—				
Russian, N.E.S.	787	78	63	928
Finnish	16	7	2	25
Scandinavian—				
Danish	35	26	17	78
Norwegian	53	55	18	126
Swedish	82	26	22	130
Servian	45	9	7	61
Spanish	581	5	5	591
Swiss	30	9	7	46
Turkish—				
Turkish, N.E.S.	11	2	3	16
Armenian	5	1	1	7
Syrian	10	7	4	21
U. S. A. Citizens	1	4	4	9
West Indian	8	9	2	19
Total immigration	9,663	2,737	1,640	14,040
Returned Canadian	4,782	1,448	597	6,827
Tourist	118	99	18	235
Totals	14,563	4,284	2,255	21,102

TABLE III.—Monthly Arrivals of Immigrants for Canada, by Nationalities, via Ports in the United States, for the Fiscal Year ended March 31, 1915.

——	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Totals.
African, South.	3	1	3	.....	.....	1	.....	.....	.....	.....	.....	.....	8
Australian.....	.....	.....	.....	.....	.....	2	.....	.....	1	.....	.....	1	4
Austro-Hungarian-													
Austrian, N.E.S.....	5	2	20	9	16	.....	.....	.....	.....	.....	.....	.....	52
Bohemian...	6	5	3	4	2	.....	.....	.....	.....	.....	.....	.....	20
Bukowinian .	.....	.....	.....	.....	4	.....	.....	.....	.....	.....	.....	.....	4
Croatian.....	11	20	9	.....	1	.....	.....	.....	.....	.....	.....	.....	41
Galician.....	1	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	2
Hungarian, N.E.S.....	.....	1	34	43	13	.....	.....	.....	.....	.....	.....	.....	91
Magyar.....	25	22	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	47
Ruthenian...	139	162	94	24	80	.....	.....	3	.....	.....	.....	.....	502
Slovak.....	12	3	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	15
Belgian.....	102	40	25	3	1	.....	4	2	5	3	20	11	216
Bermudian...	.....	.....	2	.....	.....	.....	1	.....	.....	.....	.....	.....	3
Bulgarian.....	747	204	29	6	3	4	.....	.....	.....	.....	.....	.....	993
Cuban.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1
Dutch.....	53	41	21	9	15	4	15	1	16	1	2	10	188
French.....	36	25	7	8	14	4	12	8	14	3	13	11	155
German.....	174	273	52	98	57	2	2	5	3	2	2	11	681
Great Britain and Ireland—													
English.....	1,278	97	111	63	24	60	191	117	63	43	48	96	2,191
Irish.....	77	29	28	15	4	16	21	15	9	.....	7	9	230
Scotch.....	98	14	8	11	7	3	5	7	20	7	7	18	205
Welsh.....	5	2	1	1	1	2	10	.....	1	1	.....	1	25
Greek.....	141	52	60	30	.....	7	8	10	7	1	1	8	325
Hawaiian.....	.....	.....	.....	.....	18	.....	.....	.....	.....	.....	.....	.....	18
Hebrew—													
Hebrew, N.E.S.....	17	6	2	12	5	.....	.....	.....	.....	.....	2	6	50
" Austrian..	13	13	7	5	12	.....	.....	.....	.....	.....	.....	.....	50
" Russian...	98	28	46	91	102	7	6	4	5	4	1	3	395
Italian.....	2,266	1,847	335	156	94	47	46	39	45	34	27	23	4,959
Jamaican.....	4	.....	11	.....	1	.....	5	.....	.....	.....	.....	.....	21
Macedonian....	.....	1	4	.....	14	.....	.....	.....	.....	.....	.....	.....	19
Montenegrin...	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2
Negro.....	.....	34	1	13	.....	3	.....	1	.....	1	3	.....	56
New Zealand..	.....	.....	.....	.....	.....	.....	.....	.....	.....	3	.....	.....	3
Polish—													
Polish, N.E.S	2	5	5	.....	3	.....	.....	.....	.....	.....	.....	.....	15
" Austrian.	62	34	26	17	20	.....	.....	1	.....	.....	.....	.....	160
" Russian..	46	44	40	2	23	.....	.....	9	.....	.....	1	.....	165
Portuguese.....	5	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	5
Roumanian....	37	27	.....	.....	.....	.....	.....	.....	2	.....	.....	.....	66
Russian—													
Russian, N.E.S.....	560	122	131	33	71	3	3	2	2	.....	.....	1	928
Finnish.....	10	.....	4	.....	.....	.....	.....	4	.....	1	.....	6	25
Scandinavian—													
Danish.....	16	9	7	7	3	6	5	3	4	2	1	15	78
Norwegian...	26	2	24	5	21	8	7	14	9	1	5	4	126
Swedish.....	27	12	15	11	10	10	5	10	15	2	4	9	130
Servian.....	39	18	2	.....	1	.....	.....	.....	.....	.....	.....	1	61
Spanish.....	203	381	2	1	.....	2	.....	.....	.....	.....	1	1	591
Swiss.....	10	3	5	10	3	1	3	1	3	.....	.....	7	46
Turkish—													
Turkish, N.E.S.....	6	1	1	.....	2	6	.....	.....	.....	.....	.....	.....	16
Armenian....	5	.....	.....	.....	.....	.....	.....	2	.....	.....	.....	.....	7
Syrian.....	2	.....	3	9	.....	.....	1	.....	5	.....	1	.....	21
U.S.A. Citizens.....	1	.....	.....	.....	5	2	.....	.....	.....	.....	.....	1	9
West Indian....	9	.....	.....	1	7	2	.....	.....	.....	.....	.....	.....	19
Totals.....	6,379	3,581	1,178	698	657	202	350	258	229	109	146	253	14,040

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TABLE IV.—Monthly Arrivals of Immigrants for Canada, by Occupation and Destination, via Ports in the United States, for the Fiscal Year ended March 31, 1915.

——	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Totals
											17		
Agriculturists	1,046	308	289	95	178	8	20	21	3	7	2	43	2,035
General labourers	4,354	2,928	528	178	111	57	10	22	15	1	7	33	8,239
Mechanics	356	145	109	163	120	15	58	8	23	3		25	1,032
Clerks, traders, etc.	145	60	37	33	17	6	16	15	9	10	10	16	374
Miners	19	2	2	6	5	1						4	39
Female servants	263	42	56	43	37	9	20	15	24	11	14	17	551
Not classified	196	96	157	180	189	106	226	177	155	77	96	115	1,770
Totals	6,379	3,581	1,178	698	657	202	350	258	229	109	146	253	14,040
Maritime Provinces	48	45	30	14	11	11	7	2	11	1	2	5	187
Quebec	1,720	1,207	274	119	132	32	83	58	56	25	47	34	3,787
Ontario	3,055	1,679	565	315	240	119	131	93	99	67	57	117	6,537
Manitoba	427	175	105	80	93	9	39	18	12	2	3	42	1,005
Saskatchewan	339	132	78	73	87	11	30	25	14	5	7	11	812
Alberta	323	139	43	55	70	11	23	36	20	3	17	19	759
British Columbia	467	203	83	42	24	9	37	26	17	6	13	25	952
Yukon Territory		1											1
Totals	6,379	3,581	1,178	698	657	202	350	258	229	109	146	253	14,040

TABLE V.—Nationality, Sex, Occupation, and Destination of Immigrant Arrivals for

	Sex.				Trade or								
					Farmers and Farm Labourers Class.			General Labourers.			Mechanics.		
	Males.	Females.	Children.	Totals.	Males.	Females.	Children.	Males.	Females.	Children.	Males.	Females.	Children.
African, South	6	1	1	8				1			4		
Australian	3	1		4									
Austro-Hungarian—													
Austrian, N.E.S.	26	15	11	52	8	3	7	10	3		5		
Bohemian	13	4	3	20	6			5			2	1	
Bukowinian	2	2		4	2	1							
Croatian	25	10	6	41	8	3	1	14	4	3	3	1	
Galician	1	1		2	1								
Hungarian, N.E.S	36	28	27	91	18	5	5	15	4	8	1	1	3
Magyar	25	13	9	47	11	2	1	12	10	8			
Ruthenian	313	120	69	502	99	38	15	211	31	27	1	1	
Slovak	5	5	5	15	5	3	5						
Belgian	120	54	42	216	66	22	17	28	5	11	8	2	2
Bermudian	1	1	1	3				1					
Bulgarian	986	3	4	993	6	1	2	975	1	1	3	1	1
Cuban	1			1									
Dutch	68	59	61	188	21	6	10	19	8	8	21	17	18
French	79	57	19	155	19	5	2	16	4	3	13	6	2
German	347	196	138	681	169	70	75	48	17	17	75	25	15
Great Britain and Ireland—													
English	978	778	435	2,191	446	106	123	107	49	49	172	75	59
Irish	113	91	26	230	29	6	4	27	5	4	16	7	1
Scotch	72	117	16	205	13	1	1	10	12		19	10	1
Welsh	9	14	2	25	4	1		1				2	
Greek	223	71	31	325	16	2	4	183	31	14	8	3	5
Hawaiian	16	1	1	18	2			14	1	1			
Hebrew—													
Hebrew, N.E.S.	21	19	10	50	2	1		1		1	7	8	
" Austrian	16	17	17	50	3	1			1		6	8	7
" Russian	139	121	135	395	5			13	7	8	91	65	67
Italian	4,062	558	339	4,959	80	17	24	3,915	395	214	33	12	10
Jamaican	4	14	3	21							2	7	1
Macedonian	18	1		19	3			15					
Montenegrin		1	1	2									
Negro	27	28	1	56	1	1		8	1		5	5	
New Zealand		1	2	3									
Polish—													
Polish, N.E.S.	8	4	3	15	5	2	2	1	1	1			
" Austrian	80	46	34	160	24	10	13	54	11	8	1		
" Russian	100	36	29	165	28	9	10	65	6	5	5	1	
Portuguese	4	1		5				4	1				
Roumanian	52	10	4	66	13	1		39	7	2			
Russian—													
Russian, N.E.S.	787	78	63	928	109	14	14	659	20	17	12	5	6
Finnish	16	7	2	25	1			9	3	2	2		
Scandinavian—													
Danish	35	26	17	78	17	4	6	7	2	1	6	3	
Norwegian	53	55	18	126	26	9	6	12	2	1	12	3	1
Swedish	82	26	22	130	32	2	1	33	2	2	11	3	2
Serbian	45	9	7	61	10	2	2	35	7	5			
Spanish	581	5	5	591	8	1		571	2	2			
Swiss	30	9	7	46	14	1		3	2	1	3	1	
Turkish—													
Turkish, N.E.S.	11	2	3	16				8	1		1		
Armenian	5	1	1	7				5					
Syrian	10	7	4	21	1			1			4	2	3
U.S.A. Citizens	1	4	4	9			4						
West Indian	8	9	2	19				2	2		1		
Totals	9,663	2,737	1,640	14,040	1,331	350	354	7,157	658	424	553	275	204

SESSIONAL PAPER No. 25

Canada, via Ports in the United States, for the Fiscal Year ended March 31, 1915.

Occupation.										Destination.							
Clerks, Traders, etc.			Miners.				Not Classified.										
Males.	Females.	Children.	Males.	Females.	Children.	Female Servants.	Males.	Females.	Children.	Maritime Provinces.	Quebec.	Ontario.	Manitoba.	Saskatchewan.	Alberta.	British Columbia.	Yukon Territory.
1								1	1	2	5	1					
							3	1		1	1	1		1			
2	1	1				4	1	4	3	2	17	9	6	11	4	3	
								3	3		1	6	1	4	6	2	
						1						1			3		
								2	2		2	34				5	
								1				2					
2						9		9	11			42	7	39	1	2	
						1	2				4	20		22	1		
						35	2	15	27	11	140	179	88	45	27	12	
						2						3		3	2	7	
7	2					8	11	15	12	3	52	35	91	13	13	9	
								1	1		2	1					
1							1			12	326	627		13	13	2	
1											1						
3						7	4	21	25		5	114	22	13	28	6	
5	1		1	1		6	25	34	12	4	82	17	14	18	14	6	
32	8	2	4			24	19	52	29	6	60	201	143	131	112	28	
84	39	22	9	4	3	211	160	294	179	16	267	1,227	185	154	166	176	
11	7					24	30	42	17	2	34	140	11	9	20	13	1
10	9					47	20	38	14	3	50	95	19	9	13	16	
						3	4	8	2	1	3	6	4	4	2	5	
10	5	1				19	6	11	7	1	156	100	19	4	13	32	
											8	7		2		1	
8	4	2				2	3	4	7		24	21	3			2	
6	2	3					1	5	7		7	41		2			
23	4	2				8	7	37	58	6	122	195	68	2	2		
12	3	3	6			24	16	107	88	56	1,341	2,757	123	49	148	485	
1						3	1	4	2	1	7	13					
						1						19					
								1	1							2	
8	6					8	5	7	1	1	14	41					
								1	2		3						
			2	1							2	10	1		2		
			1			15		10	13	2	32	53	52	8	12	1	
			1			8	1	12	14	5	33	94	8	11	14		
																5	
								2	2		2	37	19	8			
1			2			21	4	18	26	42	444	159	50	92	53	88	
			3	1		3	1				2	15	3	3	1	1	
2	3					7	3	7	10	1	7	26	16	8	13	7	
1						28	2	13	10		4	11	18	47	39	7	
2						11	4	8	17	7	18	11	19	27	32	16	
												15		46			
							2	2	3		477	107	1			6	
5							5	5	6		9	11	14	6	4	2	
1							1	1	3	1	4	11					
								1	1			4				3	
2	2					1	2	2	1	1	9	5		4	1	1	
1						3		1			3	1		4		1	
						7	5		2		7	12					
242	96	36	29	7	3	551	351	800	619	187	3,787	6,537	1,005	812	759	952	1

REJECTIONS BY CAUSES, at Ocean Ports, from December, 1902, to March 31, 1915.

	Fiscal Year.													
	1902-03.	1903-04.	1904-05.	1905-06.	9 months ended Mar. 31, 1907.	1907-08.	1908-09.	1909-10.	1910-11.	1911-12.	1912-13.	1913-14.	1914-15.	Totals.
Abscess									1	1	1	1	2	6
Accompanying patients	16		13	39	21	58	60	42	104	53	28	76	58	568
Acute iritis										1	1			2
Adenitis										1	1	2	11	15
Alcoholism				3	3	1	5	8	3	2	4	7		36
Anaemia						2				1	1	3		7
Ankylosis						2						1		3
Arterial sclerosis								1	14		2	2		19
Asthma										1				1
Avoiding inspection											10	12	2	24
Bad character			12			3								15
Barbers' itch										1	2		1	4
Beriberi											1			1
Blennorrhagia										1				1
Blepharitis									1					1
Blindness	1							2		2				5
Bronchitis						1							1	2
Cancer								1						1
Cataract			1	1	1	3	1			1	1		4	13
Cellulitis											1			1
Choroiditis						1	1							2
Chronic catarrh of stomach												1		1
Chronic inflammation											1	1		2
Chronic iritis												2		2
Cirrhosis							1							1
Conjunctivitis		1	4	2	4		1	3	13	3	18	11	2	62
Contract labour						23		33	28	3				87
Contravention of Order in Council								2	23					25
Convulsions								1						1
Corneal opacity						1	1				1	1		4
Criminality			1	6	7	17	6	9	10	5	4	3	2	70
Crippled			2	5	3	3	1	2	1	1				18
Curvature of spine						2		4	2	2	3	3	2	18
Cystic thyroid											1			1

Deafness								1							1
Deaf and dumb				4	5	1		2		1	1	1	1		16
Defective sight				3	14	12	17	2	15	3	1	5	1		73
Deformity			1									1			2
Degeneracy					2										2
Delusions								1	2		1				4
Desertion									1						1
Diabetes					1										1
Diseased gland								4	5	1	4				14
Dislocations						1			2	2	3				8
Dropsy			1												1
Eczema			1												1
Emphysema							1								1
Empyema					1	1					1				3
Endocarditis												10	1		11
Epilepsy		9	2	5	3	4		4	8	5	7	2	1		50
Erysipelas						1									1
Exophthalmos													1		1
Favus	7	16	7	2	2	5	2	1	1	3		3	1		50
Fever										1					1
Fractures						1		1	1						3
General debility		1		2			2	12		3	1				21
Goitre				1				1	4	3	3	1	1		14
Gonorrhoea			1				1	1	1	2	3	1	2		12
Gout		1													1
Hare lip							1								1
Head tax										6					6
Heart disease			3	2	2	6	5	5	8	5	13	22	11		82
Hemiplegia						1						1			2
Hernia			1		4	8	3	11	20	8	13	33	13		114
High temperature								2	5						7
Hip disease								1	1		1				3
Hookworm												1			1
Hydrocele									2		1		1		4
Hysteria							1	2	1		2				6
Idiocy			1	3		3		4	5			2			18
Illegitimacy									1						1
Imbecility					3		1	3		2	4	21	4		38
Immorality					3	10	12	22	35	16	15	31	30		174
Indirect passage							4	29	25	112	45	55	35		305
Inflammation of gland												1	2		3
Insanity		5	2	11	7	19	13	15	5	15	22	15	5		134
Keratitis			1						1		1	3			6
Lack of funds				1		85	67	34	1,038	246	201	994	452		3,121
Lameness									1	2		1			4
Laryngitis												1			1
Leprosy							1								1
Likely to become public charges		49	56	73	57	292	66	681	274	164	56	76	71		1,915
Locomotor ataxia			1			2	1		1	2	1				8
Lupus				1	4		1		1						7

REJECTIONS, BY CAUSES, at Ocean Ports, from December 1902, to March 31, 1915—*Concluded.*

	Fiscal Year.													
	1902-03.	1903-04.	1904-05.	1905-06.	9 months ended Mar. 31, 1907.	1907-08.	1908-09.	1909-10.	1910-11.	1911-12.	1912-13.	1913-14.	1914-15.	Totals.
Malaria									1					1
Melancholia			1		1						1	3	1	7
Mentally deficient	1		3	8	2	9	27	24	22	25	21	22	50	214
Muscular atrophy					1	3	2							6
Nephritis										1			1	2
Nervous disease					1				3				1	5
No passport					30	3	1	2		7		111	3	157
Not complying with regulations							2							2
Opium habit					2									2
Paralysis			1	8	2		1	2	2	2	4	2	1	25
Parotiditis						1								1
Partial blindness											8	1		9
Pediculosis									1					1
Pityriasis rubra									2					2
Pleurisy					1							1		2
Pneumonia		1							1					2
Polygamy								2	1					3
Poor physique	1			6	5	31	6	13	41	10	64	30	38	245
Pott's disease					1									1
Pregnancy					2	5	1		2	5	2	3	1	21
Presenility												1		1
Previously rejected									1	8	1			10
Procuring					1	2				6		2	2	13
Prostitution					8	18	1			4		2	1	34
Psoriasis							1	2	1	1	1	1	1	8
Ran away from home				1	5									6
Rheumatism			1	4	1							4	2	12
Rickets						1								1
Scabies							2	1						3
Sclerosis											1		1	2
Scoliosis											1			1
Senility		1		6	1	3	2	4	15	4	4	2	1	49
Skin disease									1		2			3
Spinal disease					1									1

Stowaway																				662
Sycosis																1				1
Syphilis			1		2			42	148	74	74	85	86	63	67	23				31
Tinea						1		2	1	1	5		2	8	6	3				13
Trachoma			246	190	486	322		176	358	94	429	326	100	72	127	138				3,064
Tuberculosis					4	4		8	11	11	11	26	21	11	34	7				148
Tumor														1						1
Ulcers													5							5
Vagrancy														2						2
Varicose veins					1				1		1	13	3	3	1	1				24
Venereal disease					1									1						2
Weak stomach												1								1
Xerodermia													1							1
Totals			273	274	611	524		440	1,172	509	1,515	2,210	972	756	1,827	998				12,081

REJECTIONS, BY NATIONALITIES, at Ocean Ports, from December, 1902, to March 31, 1915.

	Fiscal Year.												Totals.
	1902-1903.	1903-1904.	1904-1905.	1905-1906.	9 months ended Mar. 31, 1907.	1907-1908.	1908-1909.	1909-1910.	1910-1911.	1911-1912.	1912-1913.	1913-1914.	1914-1915.	
African, South										1		9		10
Albanian											2	9		11
Algerian											1			1
Australian			1			1	3	5	2	2				14
Austro-Hungarians—														
Austrian, N.E.S.	7	8	15	22	2	34	6	14	32	22	29	73	64	328
Bohemian						1	1		2	1				5
Bukowinians		3	7	13		4	8	17	9	3	6	37	26	133
Croatian				1		1	4	6	15	1		2	5	35
Dalmatians						1								1
Galician	30	18	58	42	6	11	16	43	38	25	13	145	62	507
Hungarian, N.E.S.	14	4	3	4		7	6	22	27	19	10	49	14	179
Magyar					2	1		1	10	2	1	2		19
Ruthenian			2	7	2	3	29	105	124	17	14	13	1	317
Slovak					3			4	1	1				9
Belgian			2	3		2	2	23	5	10	1	7	3	58
Bermudian											1	1		2
Bulgarian						176		50	162	74	11	223	52	748
Chinese			9	8	1	21	1	9	105	40	46	30	19	289
Corean				2										2
Dutch							2	1	7	6	1	1	2	20
French			2	4	6	12	18	24	22	13	8	17	10	136
German—														
German, N.E.S.	13	6	10	10	5	33	20	29	72	22	17	23	13	273
Prussian			1											1
Great Britain and Ireland—														
English	2	7	10	56	48	79	93	141	184	179	118	142	126	1,185
Irish			1	13	5	18	22	16	17	15	25	12	14	158
Scotch			2	5	7	30	31	25	26	28	17	16	26	213
Welsh		1		2	1	3		1	6	5	1	1	3	24
Greek	2		1	4	2	47	3	36	90	24	33	45	20	307
Hebrew—														
Hebrew, N.E.S.			3	1	1	13	3		14	10		5	1	51
" Austrian			4			1	1	1	3	7	3	5	1	26

" Polish				1										1
" Roumanian													2	2
" Russian		1	108	33	33	38	32	72	139	56	39	87	33	671
Hindoo				18	120	218	4	6		2	8	21	92	489
Italian	6	8	69	57	29	65	33	169	404	174	173	341	140	1,668
Jamaican								1		3				4
Japanese			70	66	98	80	26	18	9	10	7	21	12	417
Macedonian											1	2		3
Maltese											1	6	1	8
Mexican									2					2
Negro				1		2								3
Newfoundland				1		3	3		5	1	2	7		22
Persian						2	1	2	18	3				26
Polish—														
Polish, N.E.S	7	7	9	1	2	3	1			1		4	1	36
" Austrian			1		1	10	9	75	51	11	8	14	3	183
" German			5					1	2	2	1	1		12
" Russian		5	58	11	9	16	6	42	31	9	15	42	19	263
Roumanian		9	3	2	1	10	3	27	31	4	2	12	9	113
Russian—														
Russian, N.E.S	149	130	41	75	24	62	87	82	86	65	66	246	121	1,234
Doukhobor										5				5
Finnish	16	3	10	11	4	8	8	45	19	11		15	3	153
Scandinavian—														
Danish			3			2	1	15	9	9	1	1	1	42
Icelandic		1		1	4			1		1				8
Norwegian		3	5	9		4	5	11	20	15	5	1	1	79
Swedish	5	1	2	4	1	8	5	23	34	8	3	5	5	104
Serbian						1	1	5	6	5			3	21
Spanish						1	3	4	28	2	2	24	21	85
Swiss									5		1		4	10
Turkish—														
Turkish, N.E.S	3	1	2	5	3	10	3	107	147	13	11	42	6	353
Arabian	7			1			1		6		1			16
Armenian	4	18	11	11	2	45	2	132	60	7	5	21	2	320
Syrian	8	40	56	2		21	4	87	101	18	21	18	5	381
U.S.A. Citizens			27	17	17	63	2	13	20	2	14	12	29	216
West Indian					1	1		4	4	8	11	17	23	69
Totals	273	274	611	524	440	1,172	509	1,515	2,210	972	756	1,827	998	12,081

DEPORTATIONS, after having been admitted, BY CAUSES, from December, 1902, to March 31, 1915.

	Fiscal Year.													
	1902–03.	1903–04.	1904–05.	1905–06.	9 months ended March 31, 1907.	1907–08.	1908–09.	1909–10.	1910–11.	1911–12.	1912–13.	1913–14.	1914–15.	Totals.
Abscess					2	1	2	2	2	3		7		19
Accompanying patients	4	3	1	4	35	26	21		18	17	16	10	34	189
Alcoholism					2	2	27		9	5	5	6	6	62
Anaemia							1				2	2	3	8
Arteritis cerebral									1					1
Arthritis												3	6	9
Asthma		1							2	1	3	9	4	20
Bad character							7	9		3				19
Beriberi													1	1
Blindness				1		2	3			2		1	1	10
Bright's disease						2	3				3	3		11
Bronchitis		1	1			3	1				1	7	5	19
Cancer		1		1			2		1	2	2	3	1	13
Cataract						1	1							2
Catarrh									1					1
Cellulitis												1		1
Chronic dysentery	1	2	1	1	1								1	7
Chronic skin disease										1				1
Colitis												1		1
Criminality		1	8	1	12	68	115	130	172	242	334	376	404	1,863
Crippled		4	4	8	4	4	11			2		1		38
Curvature of spine						3	1					1	2	7
Cystitis	1	1		1	2	1	1	1					2	10
Deafness						2	4							6
Defective sight		1	1	6	4	5	11					2	2	32
Diabetes					1		2					1		4
Diseased leg											1			1
Dislocations	2					1								3
Drug habit						1						1		2
Eczema							1	6			1	1		9
Endocarditis												12	2	14
Epilepsy	6	4	2	6	6	15	22	8	10	10	8	19	13	129
Erysipelas												2		2
Fistula						1	1							2
General debility	7	8	7	18		60	97	27	1	1				226
Haemoptysis	1	1												2
Heart disease	2	1	3	7	3	5	13	4	3	3	9	17	7	77
Hemiplegia											1	1	1	3
Hemorrhage												1	1	2
Hemorrhoids	1											1		2
Hernia			2	3			8		2	1		2	5	23
Hip disease							1				1			2
Idiocy	1		4					2						7
Imbecility		1	1	1	2	2	35	1						43
Immorality										24	38	38	39	139
Injured						7	6	1						14
Insanity	1	5	5	12	53	110	113	95	121	133	220	207	144	1,219
Insomnia		1				1		1						3
Iritis													1	1
Jaundice												2		2
Keratitis												1	2	3
Kidney disease							1			2				3
Laryngitis												1		1
Leprosy											3		1	4
Locomotor ataxia													3	3
Malaria						1		2						3
Melancholia											1	3		4
Mental weakness	7	8	2	17	20	43	1	9	17	9	10	15	10	168
Muscular atrophy				1				2						3
Necrosis													1	1
Nephritis											1	4	1	6
Neurasthenia	1		1						1	1	2	4	9	19

DEPORTATIONS, after having been admitted, BY CAUSES, from December, 1902, to March 31, 1915.—*Concluded.*

	Fiscal Year.													
	1902-03.	1903-04.	1904-05.	1905-06.	9 months ended March 31, 1907.	1907-08.	1908-09.	1909-10.	1910-11.	1911-12.	1912-13.	1913-14.	1914-15.	Totals.
Neuritis												6		6
Neurosis													1	1
Nostalgia							1		1					2
Osteoarthritis											1			1
Paralysis		3	1	7		5	5	3	2	1	6	9	6	48
Pediculosis												1		1
Peritonitis													1	1
Phlebitis												1		1
Pleurisy	1	1										2	1	5
Poisoning (lead)					1									1
Poor physique											9	8	1	18
Pott's disease							2						1	3
Pregnancy						1		3	2	2		5		13
Procuring											5	3	1	9
Prostitution		1		2		8	8	6	10	9	15	20	11	90
Public charges	14	19	19	18	28	309	1,074	348	289	343	392	715	789	4,357
Rheumatism	8	7	6	11	10	29	15	8	2	7	12	42	27	184
Salpingitis												1		1
Sclerosis			1								1	1	2	5
Senility						8	10	3	1				1	23
Tonsilitis													1	1
Trachoma			2			1	1	2	8		1	2	2	19
Tuberculosis	8	8	13	6	13	67	54	30	33	39	61	139	82	553
Ulcers											3	1	2	6
Urethritis												1		1
Vagrancy				2		21	56	29	61	84	107	97	77	534
Varicose veins	1	1		3	2	5	6			2	1	2	6	29
Venereal disease		1	1			4	4	2	2	2	1	8	10	35
Violation of Immigration Act									12	8	4	4		28
Totals	67	85	86	137	201	825	1,748	734	784	959	1,281	1,834	1,734	10,475

DEPORTATIONS, after having been admitted, BY NATIONALITIES, from December, 1902, to March 31, 1915.

	Fiscal Year.													
	1902-03.	1903-04.	1904-05.	1905-06.	9 months ended March 31, 1907.	1907-08.	1908-09.	1909-10.	1910-11.	1911-12.	1912-13.	1913-14.	1914-15.	Totals.
African, South							1			1				2
Australian						1	1	4	1		2	2	1	12
Austro-Hungarian—														
Austrian, N.E.S.		1				4	17	4	10	21	30	110	59	256
Bohemian							3	1		1	2			7
Bukowinian			1			5	4		3	1	1	1	1	17
Croatian												1		1
Galician	1		1	4	4	15	16	11	10	6	9	14	15	106
Hungarian, N.E.S.				1	1	3	1				5	6		17
Ruthenian							1	6	5	11	7	35	16	81
Slovak									1					1
Belgian				1	2		2	8	6	6	4	3	7	39
Bulgarian						65	74				2	1	3	145
Chinese			1		1	1	1	1	2	6	16	18	33	80
Dutch						10	12	3	2	1	13	5	8	54
French			1	1	3	4	18	11	12	22	26	24	9	131
German		1			1	8	7	17	10	6	25	38	13	126
Great Britain and Ireland—														
English	43	58	61	98	130	513	1,081	355	342	406	387	693	699	4,866
Irish		2	2	3	10	31	34	37	23	41	47	65	48	343
Scotch	7	8	9	8	26	61	119	89	90	89	118	184	119	927
Welsh		1	2	3	2	2	1	5	3	4	7	10	11	51
Greek							32	2	11	2	2	2	5	56
Hebrew—														
Hebrew, N.E.S.			1	8	2	2	32	2	3		5			55
" Austrian							2		1		5	3	2	13
" Dutch												1		1
" German												2		2
" Polish						1		1			1			3
" Roumanian												4		4
" Russian				1	2	6	11	1	5	2	5	32	16	81
Hindoo							24	1	1	2	1		2	31
Italian	1	4	1		1	13	13	15	13	12	17	35	66	191
Jamaican				1			1							2
Japanese							4	1	1	1		1	3	11
Maltese											1	4	2	7
Montenegrin											2			2
Negro						1	1							2
Newfoundland								8		3	5	1	2	19
New Zealand											1		1	2
Polish—														
Polish, N.E.S.				1	1	8		2	3	1	8	5	7	36
" Austrian									1	6	2	2	2	13
" German								1						1
" Russian						1	3	1	1	1	12	4	2	25
Portuguese													1	1
Roumanian	1	1				2	42	3	2	4	4	5	3	67
Russian—														
Russian, N.E.S.					1	9	49	5	5	16	29	54	27	195
Finnish		4	1			2	3	4	4	3	14	11	5	51
Scandinavian—														
Danish		2	2	2	1	6	4	2	3	2	5	2	7	38
Icelandic	3			1				1				1		6
Norwegian	8	2	1	1	1	4	2	3	12	5	21	13	10	83
Swedish	3	1	2	1	4	9	7	6	8	12	20	10	11	94
Serbian									7		1	1	2	11
Spanish							1			2	1		3	7
Swiss							2	2	1	1	12	3	6	27
Turkish—														
Turkish, N.E.S.							20			1	2	1		24
Armenian										1	1	1		3
Syrian						1	1	1	7	1				11

DEPORTATIONS, after having been admitted, BY NATIONALITIES, from December, 1902, to March 31, 1915.—*Concluded.*

	Fiscal Year.													
	1902-03.	1903-04.	1904-05.	1905-06.	9 months ended March 31, 1907.	1907-08.	1908-09.	1909-10.	1910-11.	1911-12.	1912-13.	1913-14.	1914-15.	Totals.
U.S.A. Citizens	....	....	....	2	8	37	98	119	169	256	377	405	461	1,932
Venezuelan	....	....	....	....	....	....	....	....	....	....	....	2	....	2
West Indian	....	....	....	....	....	....	3	1	6	3	26	19	46	104
Totals	67	85	86	137	201	825	1,748	734	784	959	1,281	1,834	1,734	10,475

DEPORTATIONS, after having been admitted, BY PROVINCES, from December, 1902, to March 31, 1915.

	Fiscal Year.													
	1902–1903.	1903–1904.	1904–1905.	1905–1906.	9 mos. ended Mar. 31, 1907.	1907–1908.	1908–1909.	1909–1910.	1910–1911.	1911–1912.	1912–1913.	1913–1914.	1914–1915.	Totals.
Maritime Provinces	....	2	....	3	2	14	19	24	25	13	45	45	55	247
Quebec	18	16	11	27	41	136	684	97	165	186	208	371	397	2,357
Ontario	3	3	8	19	79	383	907	378	349	348	419	574	543	4,013
Manitoba	....	....	....	....	66	226	48	97	121	174	230	334	199	2,848
Saskatchewan	46	64	67	88	3	19	27	19	23	35	44	59	85	
Alberta	....	....	....	....	4	24	14	63	55	95	131	164	224	
British Columbia	....	....	....	....	5	23	49	56	46	108	204	287	228	1,006
Yukon Territory	....	....	....	....	1	....	....	....	....	....	....	....	3	4
Totals	67	85	86	137	201	825	1,748	734	784	959	1,281	1,834	1,734	10,475

The following is a statement showing immigration literature, etc., ordered during the year 1914-15:—

Atlas of Canada, English	321,860
" French	50,000
Canada West, English	508,000
" French	75,000
" Danish	25,000
" Swedish	25,000
" Norwegian	25,000
Poster's My Land	50,000
Canada Farm Year Book	500
Peace River, French	10,000
Central Alberta, French	5,000
Nova Scotia	90,000
Western Quebec	20,000
Eastern "	20,000
Facts and Figures	6,000
Canada The Land of Opportunity	50,894
Where should you go	300,000
Classes Canada Calls For	100,000
The Country Called Canada	200,800
Settling on Canada's Free Land	100,000
The Eastern Townships of Quebec	25,000
Land Regulations in Canada	56,500
The Heart of Canada	25,000
New Brunswick	30,000
Prince Edward Island	25,000
Women's Work in Canada	51,700
Canada's Farthest South	50,000
What Irishmen say of Canada	12,800
British Columbia	27,250
Calendars	53,000

MAPS.

Dominion of Canada School Map	25,000
" Small "	33,000
Manitoba, Saskatchewan and Alberta	5,000

NEWSPAPERS.

The Danebrog, Danish	12,000
Der Norwestern, German	52,000
Keimskringla, Icelandic	78,000
Scottish Canadian	3,000
Northern Echo Supplement, *Sheffield Independent*, *Birmingham Gazette*	50,000

During the year, 369,813 pieces of mail were received and attended to. The outgoing letters and telegrams for the year numbered 148,103.

Your obedient servant,

W. D. SCOTT,

Superintendent of Immigration.

Ottawa, June 15, 1915.

W. W. Cory, Esq., C.M.G.,
Deputy Minister of the Interior,
Ottawa, Canada.

Sir,—I have the honour to submit my report for the fiscal year ended March 31, 1915.

During the fiscal year just closed, 1,258 persons of Chinese origin have been admitted into Canada, of whom 103 were admitted as exempt from head-tax, and 1,155 upon the payment of $500 each. For the purpose of comparison it is considered advisable to publish the inclosed statistics relating to Chinese immigration since the imposition of the first head-tax in 1885, which head-tax was increased to $100 on January 1, 1901, and to $500 on January 1, 1904.

Fiscal Years.	Exempts.	Paying Tax.	Percentage of total arrivals admitted exempt.	Registered for Leave.	Total Revenue.
					$ cts.
1886	1	211	0·47	829	11,693 00
1887	.....	124	.....	734	7,424 50
1888	.....	290	.....	868	15,694 50
1889	112	782	12·53	1,322	40,808 00
1890	97	1,069	8·32	1,671	56,258 00
1891	12	2,114	0·56	1,617	107,785 50
1892	6	3,276	0·18	2,168	166,502 50
1893	14	2,244	0·62	1,277	113,491 00
1894	22	2,087	1·04	666	105,021 50
1895	22	1,440	1·50	473	72,475 00
1896	24	1,762	1·34	697	88,800 50
1897	24	2,447	0·97	768	123,119 50
1898	17	2,175	0·78	802	109,754 00
1899	17	4,385	0·39	859	220,309 50
1900	26	4,231	0·61	1,102	215,102 00
1901	26	2,518	1·02	1,204	178,704 00
1902	62	3,525	1·73	1,922	364,972 00
1903	84	5,245	1·58	2,044	526,744 00
1904	128	4,719	2·64	1,920	474,420 00
1904-05	69	8	89·61	2,080	6,080 00
1905-06	146	22	86·90	2,421	13,521 00
1906-07	200	91	68·73	2,594	48,094 00
1907-08	752	1,482	33·66	3,535	746,535 00
1908-09	695	1,411	33·00	3,731	713,131 00
1909-10	688	1,614	29·89	4,002	813,003 00
1910-11	805	4,515	15·13	3,956	2,262,056 00
1911-12	498	6,083	7·56	4,322	3,049,722 00
1912-13	367	7,078	4·93	3,742	3,549,242 00
1913-14	238	5,274	4·32	3,450	2,644,593 00
1914-15	103	1,155	8·19	4,373	588,124 00
	5,255	73,377	6·68	61,149	17,433,180 00

The marked decrease in Chinese immigration in the fiscal year 1914-15, as compared with former years, was caused by the enforcement against Chinese since May 31, 1915, of the new regulation prohibiting the arrival at British Columbia ports of artisans and labourers, skilled and unskilled.

The replacing of lost certificates and the granting of new ones in exchange for those without photographs, so that every person of Chinese origin legally admitted into Canada will have documentary proof of that fact, has been diligently carried on throughout the year, and on March 31, 1915, there had been issued 8,901 certificates in exchange for old ones, and 6,624 certificates to those who had lost their certificates, but who had satisfied the department that they had been legally admitted.

Your obedient servant,

W. D. SCOTT.

Chief Controller of Chinese Immigration.

SESSIONAL PAPER No. 25

REPORT OF THE SECRETARY, OFFICE OF THE HIGH COMMISSIONER.

17, Victoria St., London, S.W., May 1, 1915.

The Honourable
The Minister of the Interior,
Ottawa, Canada.

Sir,—Herewith, I beg to forward the following emigration reports for the fiscal year ending March 31, 1915: Mr. J. Obed Smith, London; Mr. A. F. Jury, Liverpool; Mr. J. K. Millar, Glasgow; Mr. F. T. Campbell, Birmingham; Mr. J. Cardale, Exeter; Mr. L. Burnett, York; Mr. F. W. Kerr, Peterborough; Mr. E. MacLeod, Carlisle; Mr. S. Pugh (2), Cardiff; Mr. G. G. Archibald, Aberdeen; Mr. E. O'Kelly, Dublin; Mr. J. Webster, Belfast; Mr. Carl Krag, Copenhagen; Mr. J. H. Stanford, Antwerp.

In the review of the year 1914, which was submitted twelve months ago, a decrease in emigration had to be recorded and a further fall in the outward movement was anticipated. The comparative figures for the first three months 1913-14 were given in the last report, and showed a reduction of 43 per cent the following four months, April, May, June, and July marked an even greater decline, from 109,059 to 43,910, or 60 per cent.

During the remaining eight months of the fiscal year, war conditions prevailed, and no comparison of any value can be made.

The following tables, compiled from the figures of the Board of Trade, are given as usual:—

EMIGRANTS.

Statement showing the Number of Persons previously resident in the United Kingdom who left to take up permanent residence in places out of Europe, as stated in the returns furnished by the Imperial Board of Trade.

During the Fiscal Year ending March 31, 1914.

Country of Future Permanent Residence.	Last Permanent Residence.[1]				Total.
	In England.	In Wales.	In Scotland.	In Ireland.	
Canada	125,669	1,285	35,881	7,715	170,550
Australia	40,572	784	5,124	1,842	48,322
New Zealand	9,093	69	2,094	844	12,100
British South Africa	8,455	253	1,493	323	10,524
India (including Ceylon)	5,064	96	1,179	198	6,537
Other British colonies and possessions	4,608	66	543	119	5,336
United States	42,371	1,766	15,164	31,539	90,840
Other foreign countries	8,100	108	785	219	9,212
	243,932	4,427	62,263	42,799	353,421

During the Fiscal Year ending March 31, 1915.

Canada	48,256	465	12,967	3,261	65,269
Australia	21,192	536	3,141	1,639	26,508
New Zealand	4,859	39	1,230	547	6,675
British South Africa	5,479	157	937	238	6,811
India (including Ceylon)	5,304	134	1,128	195	6,761
Other British colonies and possessions	4,173	62	412	73	4,720
United States	30,756	1,034	9,034	22,987	63,811
Other foreign countries	4,563	84	578	139	5,364
	124,902	2,511	29,427	29,079	185,919

[1]In this and the following tables, residence for a year or more is treated as permanent residence.

IMMIGRANTS.

STATEMENT showing the Number of Persons who arrived from places out of Europe to take up permanent residence in the United Kingdom, as stated in the returns furnished by the Imperial Board of Trade.

DURING THE FISCAL YEAR ENDING MARCH 31, 1914.

Country of Last Permanent Residence.	Future Permanent Residence.				
	In England.	In Wales.	In Scotland.	In Ireland.	Total.
Canada	19,948	562	6,221	1,238	27,969
Australia	10,630	238	1,401	493	12,762
New Zealand	2,011	22	389	149	2,571
British South Africa	8,566	246	1,505	377	10,694
India (including Ceylon)	4,845	47	815	173	5,880
Other British colonies and possessions	3,467	41	445	109	4,062
United States	11,424	323	2,967	3,280	17,994
Other foreign countries	6,640	143	709	211	7,703
	67,531	1,622	14,452	6,030	89,635

DURING THE FISCAL YEAR ENDING MARCH 31, 1915.

Canada	26,257	638	7,533	1,562	35,990
Australia	11,137	220	1,312	489	13,158
New Zealand	2,098	41	452	163	2,754
British South Africa	8,502	213	1,547	348	10,610
India (including Ceylon)	6,925	80	1,008	282	8,295
Other British colonies and possessions	4,676	52	520	125	5,373
United States	12,497	514	3,599	4,838	21,448
Other foreign countries	9,226	137	918	249	10,530
	81,318	1,895	16,889	8,056	108,158

EMIGRANTS.

STATEMENT showing the Number of Persons previously resident in the United Kingdom who left to take up permanent residence in places out of Europe, as stated in the returns furnished by the Imperial Board of Trade.

DURING THE FISCAL YEAR ENDING MARCH 31, 1914.

Country of Future Permanent Residence.	Last Permanent Residence.				Total.
	In England.	In Wales.	In Scotland.	In Ireland.	
Canada	12,953	142	2,882	597	16,574
Australia	7,836	174	1,050	362	9,422
New Zealand	1,387	12	266	178	1,843
British South Africa	1,820	52	214	66	2,152
India (including Ceylon)	1,115	17	201	47	1,380
Other British Colonies and Possessions	1,210	24	141	20	1,395
United States	6,017	233	2,060	2,363	10,673
Other foreign Countries	1,711	30	148	50	1,939
	34,049	684	6,962	3,683	45,378

DURING THE THREE MONTHS ENDING MARCH 31, 1915.

Canada	2,945	23	412	158	3,538
Australia	2,786	67	397	292	3,542
New Zealand	450	5	135	57	647
British South Africa	977	32	131	38	1,178
India (including Ceylon)	1,083	24	240	43	1,390
Other British colonies and possessions	999	18	94	8	1,119
United States	2,838	91	640	1,212	4,781
Other foreign countries	795	14	121	36	966
	12,873	274	2,170	1,844	17,161

IMMIGRANTS.

STATEMENT showing the Number of Persons who arrived from places out of Europe to take up permanent residence in the United Kingdom, as stated in the returns furnished by the Imperial Board of Trade.

DURING THE THREE MONTHS ENDING MARCH 31, 1914.

Country of Last Permanent Residence.	Future Permanent Residence.				Total
	In England.	In Wales.	In Scotland.	In Ireland.	
Canada	2,930	68	783	217	3,998
Australia	1,895	44	291	77	2,307
New Zealand	367	1	54	36	458
British South Africa	1,793	49	301	58	2,201
India (including Ceylon)	811		120	22	953
Other British colonies and possessions	668	9	87	23	787
United States	1,689	39	402	391	2,521
Other foreign countries	1,068	9	122	47	1,246
	11,221	219	2,160	871	14,471

DURING THE THREE MONTHS ENDING MARCH 31, 1915.

Canada	4,551	99	1,102	186	5,938
Australia	1,677	26	195	57	1,955
New Zealand	285	8	36	14	343
British South Africa	1,289	9	215	31	1,544
India (including Ceylon)	1,116	4	142	28	1,290
Other British colonies and possessions	1,009	15	133	26	1,183
United States	1,956	78	556	489	3,079
Other foreign countries	1,992	26	233	51	2,302
	13,875	265	2,612	882	17,634

It has been noticed that in the press and elsewhere, expression has already been given to the expectation of a large emigration movement at the close of the war, but the basis of such speculation is so unstable that it would be unprofitable to build upon it. The economic situation here and in Canada is likely to be the factor exercising the greatest influence, but the other conditions will be entirely novel, and their consequences are very uncertain. The developments which take place will be carefully watched, and advantage will be taken of every opportunity to promote the interests of the Dominion.

There has been no decrease in the circulation of the weekly news cablegram, and no loss of interest in the information it disseminates. This is one of the forms of propaganda which may properly and usefully be continued under the present conditions.

I have the honour to be, sir,

Your obedient servant,

W. L. GRIFFITH,

Official Secretary.

REPORT OF J. OBED SMITH.

11 AND 13 CHARING CROSS,

LONDON, S.W., March 31, 1915.

The Hon. Sir GEORGE H. PERLEY,
Acting High Commissioner for Canada,
17 Victoria Street,
London, S.W.

SIR,—I have the honour to submit the following as my report on the work of the Emigration Brauch of the Department of the Interior, covering all agencies in the British Isles, the informations agencies in Paris, Antwerp, and Copenhagen, and generally the work in Europe, for the year ending March 31, 1915, and I have attached hereto the individual reports to myself from the various emigration agents of this branch, specially dealing with their work for the said fiscal year.

A visit of inspection by the Deputy Minister of the Interior was welcomed by all the staff as securing harmony of work on both sides of the Atlantic. At least an annual visit by the honourable the minister, his deputy or the superintendent is very desirable, and before the termination of the war more than usually necessary.

Since the last annual report, suitable premises at 28 High street, Cardiff, have been opened in connection with the work of the department in Wales. Mr. Sydney W. Pugh ably fulfils the duties of agent there, in addition to his work as inspector of agencies in Europe.

Mr. Frederick Campbell was appointed in charge of the office in Birmingham, in place of Mr. Thomas Hammond, who resigned on account of ill health.

The work of visiting licensed booking agents from time to time has been continued by our own officers, so far as the opportunity permitted. I am glad to report that the booking agents have carried on their business within the printed regulations and the defined policy of the department, and they continue to submit any doubtful case to this office before booking the passenger.

On the 25th May, 1914, I issued the following general circular:—

> "Owing to the world-wide Canadian financial stringency and the consequent curtailment of large works of development, the Government of Canada, finds that there are now in the Dominion sufficient artisans and skilled and unskilled labourers to carry on all contemplated works during the year 1914, and consequently hereby advises persons belonging to the above-mentioned occupations and desiring to emigrate to Canada, to postpone such action until normal conditions again prevail.

"The demand was never stronger for farm labourers and female domestic servants than at present, and these may go forward with the full assurance of finding work immediately upon arrival.

"There are also many excellent openings for farmers with capital in all provinces of the Dominion.

"Inquiries on all or any of the above questions are invited by any Canadian Government office in the British Isles."

And the same was effective until the outbreak of the Great War in August, 1914. Since that event our emigration propaganda has become considerably less active, and few persons have been recommended to go to Canada, unless they are relations joining or completing a family already there. Nevertheless, we have advised all inquirers along general lines, looking to the value of that work when the present abnormal conditions in connection with Canada and the rest of the British Empire are materially changed.

The necessity for curtailing the flow of emigrants from the British Isles and the Continent to Canada, set out in the above circular, continued until the outbreak of the war, which had the resultant effect in Canada, as elsewhere, of dislocating commercial and other activities, thus releasing for work upon the land a number of men who, but for the war, would otherwise not have been available. Therefore, agents have not encouraged any class of labour to seek engagements in Canada for some months past.

We are continuing to receive through our various offices general inquiries regarding Canada, and we give them the usual attention, in the belief that a change in conditions in future will warrant these inquirers pursuing the question further, and becoming residents of our Dominion.

Canada will have to meet from Australia and New Zealand the same competition in the general emigration field when peace is concluded as she has in the past, and even at present active competition prevails. The whole field for emigration from Europe will need full and exhaustive consideration before and when hostilities cease, because many conditions will have changed.

A number of the usual agricultural exhibitions and shows have been cancelled in the year 1915, but we have made a careful selection of those which are proceeding, and will make suitable displays thereat. The distribution of the Atlas of Canada amongst school children and others has proceeded rapidly, and I am convinced will produce good and effective results for the Dominion.

We have continued the policy of issuing news items to nearly nine hundred papers and magazines each week, and notwithstanding the space occupied by war news items, Canada has been fairly and even generously treated, considering the fact that general advertising was cut off almost immediately the war started.

Deeming it unwise to pursue an active propaganda with our exhibition wagons, they were all taken off the road, the horse wagons were stored, and the two exhibition motor cars loaned to the War Office for military purposes.

The unfavourable business conditions in Canada between April 1, 1914, and the outbreak of war would account for the small number of new arrivals in the Dominion up to August, and since the war commenced the conditions all over the Empire have been such as to make it essential on the part of Governments and departments to assist in the defence of the Empire, rather than engage in work which might seem contrary to the good purposes of imperial defence.

I have pleasure in reporting that twenty-six male members of our staff in Europe of military age (and some over) volunteered their services in connection with the military forces of the Empire; others have attached themselves to civilian forces.

Through the various offices of the department on this side of the Atlantic we have distributed during the past year 1,218,369 pieces of literature, 52,010 calendars, 10,289 wall maps, and 356,300 school atlases of Canada, but in view of the present

conditions it was deemed inadvisable to distribute the new wall poster which had been prepared, and the same is now available for a favourable opportunity of display.

Inasmuch as nearly all the Canadian steamers were requisitioned by the Imperial Government for war purposes, the sailings from the British Isles have been very much reduced, but during the past year there were 222 sailings from the British Isles, and forty-four from continental ports, carrying passengers to Canada.

There has been no change in the regulations in respect to the admission of persons financially aided by public funds or charitable institutions. We have not encouraged the emigration of such persons, in view of the general lack of employment, and only 629 persons received special cards of admission. No restriction was placed upon the emigration of children by societies here to their receiving homes in Canada.

Whenever the number of persons on a steamer going to Canada made it worth while, an inspection of the accommodation on such steamers was made by our agents, as in previous years.

General agreement between the department, the officers of the Provincial Governments of Canada and the transportation companies has continued to be a feature of the year's business, and it is with special pleasure that I desire to place on record the cordial co-operation in our work by the British Government's Emigrants' Information Office, the Local Government Board, the Board of Trade, and other Imperial departments.

During the year we received 220 cases of grain and grasses, 135 cases of threshed grains, and a supply of apples sufficient for the diminished number of exhibitions, and the making of effective displays in our various shop windows.

During last year 10,286 persons called at Charing Cross offices in London to make inquiries regarding emigration, and over 13,000 more called for a copy of the Canadian Atlas.

The official files of the London office were increased by 68,794 attachments, and there were sent out from this office, during the same period, 38,840 parcels of literature.

We have received much assistance, freely tendered, by the Trade Commissioners for Canada, both in Rotterdam and in Hamburg, but the latter city being within the sphere of hostilities, does not afford any opportunity of further comment in this report. In Holland we have had few inquiries since the outbreak of war.

Owing to the continued ill-health of the emigration agent in Paris, it was deemed advisable, at the outbreak of the war, that this office should again assume control of the emigration work in France. I regret to have to report that three days before the close of the fiscal year, Mr. Paul Wiallard, for over twelve years agent of the department in Paris, succumbed to an illness extending over fifteen months. Until the outbreak of the war, much good work was done by the agency in question, but since then, owing to the depletion of the staff, by transfer to Canada and to military service, the office premises hitherto used for emigration purposes (after damage by aerial bombardment) have been closed, and the balance of the staff temporarily placed under the control of the General Commissioner for Canada in that city.

I have the honour to remain, sir,

Your obedient servant,

J. OBED SMITH,

Assistant Superintendent of Emigration.

REPORT OF W. J. WHITE, INSPECTOR OF UNITED STATES AGENCIES.

OTTAWA, April 1, 1915.

SIR,—I beg to report that the results of the work of the Immigration Branch in the United States for the year just closed show that confidence in the present and future of Western Canada is deeply and firmly established. From an agricultural viewpoint, conditions have been withstood that would have given a country that did not possess the recuperative powers of Western Canada's agriculture a decided setback from which it would not have recovered for years. The strength that the provinces of Manitoba, Alberta, and Saskatchewan have shown during a period when the resources of all other countries were being taxed to the utmost has had a splendid effect in those parts of the United States in which the Immigration Branch is operating.

It was to be expected when war was declared that there would be a nervous feeling amongst those who contemplated moving to a country that was amongst those at war. Through the press of the United States and with the excellent assistance of the different agents in the States, the efforts to dissipate this feeling were successful to a large degree. We had to contend with false reports circulated by those who were embittered against Canada on account of its participation in a war waged against their kinsmen. We had to meet the most libellous statements, widely circulated by landholders interested in keeping away from Canada those who might otherwise purchase from them. An immense crop of grain in the states in which we were working, and an improved condition over other years in these states, made the inducement to leave less pressing. An almost complete failure of crops in some portions of Western Canada was magnified into a total failure over the entire West, and it was only by strenuous, indefatigable and unceasing work that the story of excellent yields and good prices began to take effect.

Reports of yields of from 20 to 40 bushels of wheat in many districts, of yields of oats and barley as great as in many past years, of dollar wheat and fifty-cent oats were received, and this news, carefully circulated, in a large measure minimized the stories of tragic loss, so carefully and generally told.

The war conditions, and the fear generated through press reports, that conscription was certain, that a heavy war tax was assessed on all lands in Canada had a decidedly bad effect. Before war was declared, several large colonies of Americans, of German and Austrian extraction, had selected their location, some in Manitoba, some in Saskatchewan, some in Alberta, and others in British Columbia. They had given up their farms in the States, had made arrangements for the sale of some of their effects, and were all ready to move. Declaration of war, accompanied by the report of conscription, placed a sudden check upon this movement. A fair estimate of the number thus affected might be placed at eight thousand. These were all farmers, good farmers too. Deeming it might be unwise to move to Canada, they made arrangements to remain on farms in the States. There has been assurance from many of them, that at the close of the war they would remove to Canada. I am pleased to say, though, that as individuals quite a number have come. The reports they are sending back to their friends offer encouragement to others.

While the war conditions have had a wonderful effect in checking a large and valuable addition to our immigration, that of an embargo placed upon the live stock intended to be brought in as part of the settlers' effects was even a more important factor. The foot-and-mouth disease that was first detected amongst the animals at the

dairy show at Chicago, was found to have spread to Illinois, Indiana, Michigan, Nebraska, Ohio, Missouri, and other states., and in fact so quickly spread, that every state in which our operations were conducted was soon found to be affected, and all became embargoed, and not an animal could be removed. The embargo became most acute during the moving months of February and Mareh. In the Kansas territory, upwards of one thousand cars were held up; the Nebraska territory about five hundred; in Michigan over three hundred; in Minnesota, five hundred. Not able to take their cattle with them, they gave up the idea of leaving for the present, and most of them were forced to rent again or make other arrangements. Some relief was afforded to a few who were able to take in horses, on making special application to the Veterinary Director General at Ottawa.

Notwithstanding the many adverse conditions, the grossly exaggerated state of Western Canada crops, war stories and conscription tales, and an embargo against live stock, which would have entirely stopped immigration to a country less able to withstand the series of drawbacks, Western Canada's immigration was wonderfully good.

The statistical reports published elsewhere show considerable falling-off as compared with some former years, but it must be borne in mind that in some of those years there was phenomenal development in building in many of the cities and towns —the boom that always comes at one time or another in the opening up of any new country. There was then a great demand for labour, not only in the cities, but in railroad work, both of which are now practically suspended. This accounted for an influx of immigration which we are not having to-day. That of to-day is absolutely that which is going on the farm.

It is true, too, that with the decrease in the number of homesteads lying near to railroads, and the greater difficulty there is in reaching those now available, there is a falling-off in the number of homesteads taken. This leaves of to-day's immigration a greater percentage taking up farms in the older settled portions of the country, while those going on homesteads is less. Although this is the case at present, I anticipate that in a short time there will be a much increased demand for these homesteads. I believe the land in the homestead area now available is of a superior quality to that in the territory now mostly taken, and as soon as the public in the United States becomes convinced of this it will be found that my prediction of a greater demand than ever for homesteads will prove correct.

There is no falling-off in the interest in Western Canada that has been growing in the United States for years past. It is as great to-day as ever, being at present temporarily checked on account of the very unusual conditions to which I have referred.

During the past year we have maintained the usual amount of publicity through the country press and the farm papers. Advertisements varying in size from 4 to 8 inches have been carried in upwards of seven thousand papers. Reading notices have appeared from time to time during the continuance of the advertisement.

At state and county fairs, exhibits of grains, grasses, roots, and vegetables were made. As usual their excellence aroused great interest as showing the splendid resources of the country to which a hearty invitation is extended. In this way we are able to reach the farming class—the class we are desirous of reaching—at a minimum of expense.

In the Eastern and New England states, the exhibits from Western Canada were supplemented by exhibits from the province of Quebec, prepared and arranged under direction of Mr. Theo. Hamel. These were very creditable and attractive, and illustrated in a very striking manner, even to those of the New England states who had formerly lived in Quebec, the agricultural resources of the province they had left, and to which they were being invited to return.

One of the most important exhibitions attended last year was the National Dairy Show held in Chicago in November. The exhibit of grains and grasses, and also vegetables from Western Canada, forwarded by Mr. J. Bruce Walker, Commissioner of

Immigration, was one of the best I have assisted in installing, and was said to be one of the best attractions there. This western exhibit was supplemented by a splendid exhibit of cheese, sent from Brockville, Ont., by Mr. J. Webster, M.P. It was an excellent advertisement for Canadian cheese, and as a result of the exhibit, I am informed that a number of orders have come forward from cheese purchasers.

Our regular agents in the United States are as follows:—M. V. MacInnes, 176 Jefferson avenue, Detroit, Mich.; C. J. Broughton, Room 412, W. Adams street, Chicago, Ill.; George A. Hall, 123 Second street, Milwaukee, Wis.; R. A. Garrett, 311 Jackson street, St. Paul, Minn.; Frank H. Hewitt, Fifth street, Des Moines, Iowa; J. S. Crawford, 301 E. Genesee street, Syracuse, N.Y.; W. S. Nethery, 82 Interurban Station, Columbus, Ohio; C. A. Laurier, Marquette, Mich.; G. W. Aird, 215 Traction-Terminal building, Indianapolis, Ind.; W. E. Black, Clifford Block, Grand Forks, N.D.; J. P. Jaffray, Walnut street, Philadelphia, Pa.; J. M. MacLachlan, drawer 197, Watertown, S.D.; W. V. Bennett, 220 Seventeenth street, room 4, Bee building, Omaha, Neb.; Geo. A. Cook, 125 West Ninth street, Kansas city, Mo.; Benj. Davies, Room 6, Dunn Block, Great Falls, Mont.; J. N. Grieve, cor. First and Post streets, Spokane, Wash.; J. E. LaForce, 29 Weybosset street, Providence, R.I.; L. N. Asselin, Biddeford, Me.; Max. A. Bowlby, 73 Tremont street, Boston, Mass.; J. A. Laferriere, 1139 Elm street, Manchester, N.H.; F. A. Harrison, 210 North Third street, Harrisburg, Pa.

Every agent is active in his work, and the territory assigned to them is that in which, according to the views of the department, the best work can be performed. Besides looking after the details of their offices, considerable travelling is done, farmers visited in their homes, and valuable assistance rendered in advising as to locations, arranging for shipment of effects, and rendering help in the selection of routes. Exhibits of grains and grasses have been placed in the various offices. Besides the work of immigration, these officials have inquiries of all kinds relating to Canada, such as customs, trade and commerce, and an infinite number relating to many other branches of the Government. All this entails considerable work, outside the sphere of immigration.

I am in hopes that we may be able to have one or two representatives at the Panama Exposition at San Francisco. Reports reaching me are to the effect that the Canadian exhibit surpasses any of its competitors in nature and character of display. With one or two direct representatives, informed as to agricultural conditions in Western Canada, I believe a wonderful amount of good from an immigration standpoint will result, in addition to the general good Canada will reap in many other ways.

It is of interest to know that during the year every state contributed to the immigration to Canada, the largest contributor being Massachusetts with 9,697; New York, 5,303; Maine, 3,247; New Hampshire, 2,588. A large proportion of these went to the provinces east of the lakes. Those contributing largely to the provinces west of the lakes were: Minnesota, 5,179; Michigan, 4,612; Washington, 3,981; North Dakota, 2,974; Illinois, 2,488; Montana, 1,459; Ohio, 1,365; Wisconsin, 1,100; Oregon, 1,080; Iowa, 1,063; Nebraska, 888; South Dakota, 729; Kansas, 701; Idaho, 699; Oklahoma, 573; Missouri 461; Colorado, 364, and California, 1,004.

Your obedient servant,

W. J. WHITE,

Inspector of U.S. Agencies.

REPORT OF J. BRUCE WALKER.

WINNIPEG, Manitoba, April 1, 1915.

SIR,—I have the honour to submit herewith my annual report for the fiscal year ending March 31, 1915.

The stream of immigration from the British Isles into Western Canada shows a considerable decrease as compared with the year 1913-14, due, in a great measure, to general trade depression in this country, and a consequent falling-off of employment for skilled artisans, common labourers, and others employed in the building trade and at railroad construction. The outbreak of the war in August, and consequent unsettled state of the money market, added still further to this depression, the inflow of capital for investment to Canada having temporarily ceased. The people who came were, generally speaking, of a desirable class, well fitted to succeed in this country.

The number of applications for farm help received by the Labour Bureau conducted in the Immigration Hall here, shows a decrease of 40 per cent as compared with the previous year. At the same time it is satisfactory to be able to state that during the year, 9,202 persons were sent to employment on farms through this office. A considerable number of the men sent had been employed in Winnipeg and district as labourers, but had been idle since October. Through the courtesy of the Canadian Pacific Railway, Canadian Northern, and Grand Trunk Pacific Railway Companies, these men were granted transportation at 1 cent per mile during February and March.

There is no demand in this country at the present time for the services of clerks in wholesale and retail stores, banks, insurance and railway offices, law offices and financial institutions, or for men as caretakers, porters, general labourers —in fact the only demand is for agriculturists. Wages offered are about the same as in previous years, namely, $30 to $35 per month for the experienced, for the season —say seven months—and for the inexperienced $10 to $15 per month, with board and lodging in both cases.

The number of settlers from the United States shows a considerable decrease as compared with past years.

It gives me pleasure to be able to state that a very large proportion of the settlers of this year—probably 80 per cent—came to this country well equipped with both experience and means to ensure their success as agriculturists.

Owing to large areas of crop in Western Canada having been seriously affected by a protracted period of drought last summer, it became imperative in order to place the settlers in the districts so affected in a position to seed the land prepared for crop in 1915, that arrangements be made to supply the requisite quantity of seed grain. These arrangements have been completed, and I am pleased to be able to inform you that the distribution of seed grain has been successfully carried out.

Since the beginning of the war the work of inspectors at boundary ports has been considerably increased, and it is gratifiing to be able to report that the inspectors have discharged their duties satisfactorily.

During the year the officers and members of the Royal Northwest Mounted Police have rendered invaluable assistance, both to this department and to the settlers, and I feel that I cannot express in too high terms my appreciation of their inestimable services which are always so freely rendered.

The immigration halls in the West have afforded accommodation to many hundreds of immigrants during the year, and I am pleased to be able to report that these halls have been efficiently operated by the officers in charge, and have been kept in a sanitary condition.

Crop Year, 1914.

The marked features of the year were: (1) the unfavourable weather conditions under which the crops in the three western provinces grew and matured; (2) the high average yield per acre of cereal crops under such unfavourable conditions; and (3) the satisfactory prices at which the grain was marketed by the producers.

The following tabulated statements give the acreage, total yield, and average yield per acre in 1914:—

MANITOBA.

	Acreage.	Yield in Bushels.	Average yield.
Wheat	3,366,200	52,491,879	15·5
Oats	2,064,114	62,034,668	30·
Barley	1,187,136	23,866,098	20·
Flax	100,191	1,001,910	10·
Rye	10,138	172,326	17·
Peas	3,742	59,872	16·

SASKATCHEWAN.

Wheat	6,003,522	74,610,645	12·42
Oats	2,792,611	66,698,953	23·88
Barley	313,537	5,627,783	18·
Flax	802,794	5,086,475	6·33

ALBERTA.

Wheat	1,039,521	15,939,287	16·01
Oats	1,147,382	34,597,117	30·15
Barley	340,992	7,847,640	23·01
Flax	41,656	207,115	4·97
Rye	14,623	261,843	17·90
Speltz	2,025	42,707	21·09

In closing my report, it again gives me great pleasure to be able to bear testimony to the conscientious and efficient work performed during the year by the officers engaged in immigration work who are under the direction of this office.

Your obedient servant,

J. BRUCE WALKER.

Commissioner of Immigration.

JUVENILE IMMIGRATION.

REPORT OF G. BOGUE SMART, CHIEF INSPECTOR OF BRITISH IMMIGRANT CHILDREN AND RECEIVING HOMES.

OTTAWA, March 31, 1915.

I have the honour to submit my sixteenth annual report as Chief Inspector of British Immigrant Children and Receiving and Distributing Homes, for the year ended March 31, 1915.

I have great pleasure in recording a satisfactory year's work, the volume of which quite equalled that of any previous year in the history of the work undertaken by the Government in this respect. Officers of this department visited and reported on 2,364 boys and girls.

The true aim, therefore, of the work under control of this department may be said to be, to safeguard the future of the child by assisting him to another portion of the Empire where his potentialities may best be developed and where his prospects in life will be immeasurably brighter than if left in his homeland to struggle along against the evils of poverty and over population.

Of the many complex questions confronting the student of immigration problems, none present a more interesting field for study than that of child immigration. The present war throws an interesting sidelight upon this subject.

The varied organizations interested in bringing juvenile immigrants from the British Isles to Canada, and placing them in foster homes here, evidently inculcate their protégés with that love of country which is so valuable an asset when the life of the nation is threatened. The Canadian Overseas contingents for active service abroad already count amongst their numbers no less than 654 young men brought to Canada in their childhood by the various organizations, and who now upon reaching manhood and hearing the call to arms, have offered their services in defence of the Empire, one portion of which was their birthplace and another portion their adopted home.

It must be remembered that these young fellows are not leaving for the front because there is nothing for them to do in Canada. They are nearly all agricultural labourers, and have voluntarily given up comfortable and sure situations to defend the Empire.

The effect of the present war will probably be to curtail the number of juveniles to be sent to Canada during the coming year, yet I am advised that up to the present there has been no diminution in the number of applications received for children at the centres of distribution.

The results of the individual inspections of the children during the past year were very gratifying indeed and show that the children were: (*a*) well placed, (*b*) healthy, (*c*) well behaved, and (*d*) giving good satisfaction.

Distribution by provinces of children under inspection during the present calendar year:—

Province.	Boys.	Girls.	Total.
Ontario	1,016	516	1,532
Quebec	292	121	413
New Brunswick	83	23	106
Nova Scotia	42	28	70
Prince Edward Island	9	2	11
Manitoba	8	4	12
Saskatchewan	1	6	7
Alberta	3	2	5
British Columbia	4	6	10
Totals	1,458	708	2,166

SESSIONAL PAPER No. 25

TABLE showing number of Juvenile Immigrants who have arrived in Canada during the past fourteen years, together with the number of applications received by the various agencies during the same period.

Fiscal Year.	Children Emigrated.	Applications Received.
1900–1	977	5,783
1901–2	1,540	8,587
1902–3	1,979	14,219
1903–4	2,212	16,573
1904–5	2,808	17,833
1905–6	3,264	19,374
1906–7	1,455	15,800
1907–8	2,375	17,239
1908–9	2,424	15,417
1909–10	2,422	18,477
1910–11	2,524	21,768
1911–12	2,689	31,040
1912–13	2,642	32,417
1913–14	1,899	30,854
Total	31,210	265,381

STATEMENT showing the number of children emigrated to Canada during the twelve months ended March 31, 1915, by the principal agencies, and the number of applications received for children during the same period.

Society or Agency	Children Emigrated.	Applications received. for children.
Dr. Barnardo's Homes, Toronto and Peterborough Ontario, and Winnipeg, Manitoba	564	24,932
Miss Macpherson, Stratford	149	596
Mr. J. W. C. Fegan, Toronto	112	500
National Children's Home and Orphanage, Hamilton	73	675
Mr. Quarrier, Fairknowe Home, Brockville	35	355
Marchmont Home, Belleville	186	1,056
The Misses Smyley, Hespeler	10	177
Mrs. Birt, Knowlton	65	651
The Catholic Emigration Association, Ottawa	253	667
Church of England Waifs and Strays Society, Sherbrooke, Quebec	170	335
Church of England Waifs and Strays Society, Niagara-on-the-Lake, Ontario	48	380
Mr. Middlemore, Halifax, Nova Scotia	97	350
Salvation Army Emigration Agency, Toronto	118	515
The Children's Aid Society of London, England	19	65
Self Help Emigration Society East End Emigration Fund	.....	
	1,899	30,854

G. BOGUE SMART,

Chief Inspector,
British Immigrant Children and Receiving Homes

PART III

SURVEYS

SURVEYS

REPORT OF THE SURVEYOR GENERAL.

OTTAWA, August 9, 1915.

The Deputy Minister of the Interior,
Ottawa.

I have the honour to submit the following report of the Topographical Surveys Branch for the year ended March 31, 1915.

The progress during the past year and the general extent of the surveys at its close are illustrated by maps which accompany the report in monograph form.

In the parliamentary appropriations for the fiscal year 1914-15 provision was made for the continuance of Dominion land surveys on practically the same scale as for the previous year; the total appropriation for this purpose being $1,047,000.

BLOCK OUTLINES.

During 1913 the tide of settlement set in strongly towards Peace River district. Extending northerly from this, Peace and Athabaska rivers afford two natural highways for the progress of future settlement. This northerly country is to a large extent unknown and unexplored. Reports so far received indicate that it is mostly wooded, but that extensive swamps occur frequently, with here and there tracts of good agricultural land. Much of the land is unsuitable for settlement, but it is impossible to foresee where future settlement will take place. In order that the department may be in a position to proceed with subdivision surveys wherever required, the system of base lines and initial meridians has been extended into the unexplored districts. As these lines form the basis for all surveys which follow, they must be established with the greatest care and accuracy. Although the surveys are carried on remote from settlement, and practically no means of communication exist with civilization, the work is carried on with great precision. The surveyor is furnished with first-class equipment in instruments, and no surveys excepting those made in geodetic work are carried out with greater refinement. Good results are being obtained, and are largely due to the attention which the surveyors devote to the many smaller, yet not unimportant, details of the work. A party of twenty-three men in charge of a Dominion land surveyor is employed on each base line or meridian surveyed. In addition to the survey of the actual line the country for a distance of twelve miles on either side is explored; from the explorers' reports, maps are prepared which show the topography of the district, the kind and quality of the timber, and the nature of the soil. Simultaneously with the surveys of the block outlines, levels of the lines are taken; these form parts of a great network of levels which is being extended over the entire country.

Four parties were employed during the year on the survey of block outlines in northern Alberta. The 29th base line (between townships 112 and 113) was surveyed from the Fifth to the Sixth meridian, a distance of 140 miles. This line passes about twenty-five miles north of Fort Vermilion, where it crosses the summit of Caribou mountains. These are lightly wooded with stunted spruce, and the surface is

covered with deep moss, underneath which the ground remains frozen from year to year. Bears and caribou are plentiful, and fish abound in several small lakes. The surrounding country is gently rolling and covered with small spruce and poplar. The soil is good and grass plentiful.

The 26th base line (between townships 100 and 101) was established easterly from Peace river to the Fifth meridian, and the 27th was continued easterly from range 8 to the meridian. When cleared, most of this district will make splendid farming land, but at present it is covered with windfall and brulé. The land being generally level, extensive drainage will be necessary to drain the swamps and make the country accessible. A third party projected the survey of the 26th base (between townships 100 and 101) from the Fourth to the Fifth meridian, approximately 150 miles. This line is situated about forty miles north of McMurray, and crosses Birch mountains about fifteen miles west of Athabaska river. Between the river and the mountains the soil is good, and in places the timber is excellent. West of the mountains a surface of moss covers a mass of boulders embedded in clay.

The survey of the 24th base (between townships 92 and 93) and the 25th base (between townships 96 and 97) were continued westerly from Athabaska river to the Fifth meridian. A large portion of the district west of Athabaska river is occupied by Birch mountains, an extensive elevated plateau covered with boulders. The surface has been burned over and is now covered with windfall and scrub. Several extensive muskegs were met with. Legend lake, about nine miles long and three miles wide, contains an abundant supply of fish. It is so named because of a superstition held by the Indians that the lake is the abode of monsters.

To prepare for settlement along the line of the Hudson Bay railway, which, to a limited extent, is expected to follow the construction of this line, three parties were occupied in pushing forward the system of block outline surveys in northern Manitoba.

The Principal meridian was continued northerly from township 80 to township 88 through a formerly unknown country. The surface, though gently rolling, is a series of muskegs, mossy sloughs, and floating bogs, covered with windfall and second-growth spruce and tamarack. Drainage, which must precede settlement, is comparatively easy owing to the numerous creeks and rivers.

The same party retraced the Second meridian from township 56 to township 85. This retracement was necessary to determine the correct bearings and chainages for the line, as many of the records of the original survey had been destroyed by a fire in the survey camp shortly before the close of field operations.

The two remaining parties surveyed short portions of base lines and meridians in the vicinity of the right of way from Split lake northeasterly to Port Nelson. This district is mostly level with intersecting ridges, the surface being largely muskeg or tamarack swamps drained in part by Nelson river. The soil is a deep clay loam overlaid with moss; it will not be suitable for agriculture until the moss has been removed. The timber, which is sparse, consists mostly of burned spruce and bluffs of green poplar. Port Nelson is the proposed terminus of the Hudson Bay railway. At the time of the survey, five hundred men were employed on the construction of the harbour there.

To prepare for this subdivision in the near future, of the lands adjacent to the easterly shore of lake Winnipeg, a party was sent to establish short portions of the base lines in that vicinity. About one hundred miles of line were surveyed. Forest fires were prevalent and destroyed large areas of timber. The land near the lake is generally level, the surface being a succession of swamps, muskegs, and low rock ridges. The muskegs are not deep, and the bottom is generally clay with more or less muck, but owing to the difficulty of drainage it is doubtful if this district will be settled in the near future. Silver and black foxes are plentiful.

TOWNSHIP SUBDIVISION.

As township subdivision is well in advance of settlement, surveys of this nature were considerably curtailed during 1914. Eighteen parties only were employed on subdivision at contract rates, whereas twenty-seven parties were employed on similar surveys the previous year. Eleven of the parties worked in the Peace River district west of Lesser Slave lake, where settlement was proceeding rapidly. In all the townships subdivided the soil is good and well suited for agriculture.

A few townships were subdivided by a party under contract around Wabiskaw lake, where several settlers had already located. This district will rapidly fill up when railway facilities are provided.

Subdivision of the lands adjacent to Athabaska river was continued, and these lands are now open for settlement as far north as township 94 or about thirty miles north of McMurray.

A few townships were surveyed in Manitoba to open up the lands ahead of settlement north of lake St. Martin and in the vicinity of Washow bay. One party was employed at each place.

Subdivision surveys being well ahead of settlement in Saskatchewan, no contract surveys were allotted in that province.

In addition to the eighteen parties employed under contract, fourteen parties were employed under daily pay for subdivision surveys which were of such a nature that they could not conveniently be executed under contract at the regular rates fixed by Order in Council. The principal surveys of this nature made during the year were at or near the following places: Fort Vermilion, in northern Alberta; Fort St. John and Hudson Hope, in the Peace River block; Peace River Crossing; Rocky Mountain House; Atikamek lake, north of Lesser Slave lake; along the Hudson Bay railway, and in the Railway Belt, British Columbia.

Surveys along the Hudson Bay railway now extend as far north as township 70, range 5, west of the Principal meridian.

Most of the surveys in the Railway Belt were undertaken at the request of the Dominion Lands agents. In addition to regular township subdivision, the survey parties in British Columbia make all necessary surveys of mineral claims and town and village sites; they also retrace the boundaries of previously surveyed Indian reserves and provincial lots. In districts where the land is most valuable the department disposes of it in parcels of forty acres or less. As the regular township subdivision in these cases is not sufficient to enable the owners to determine the boundaries of their holdings, an effort is made to survey two or more boundaries of each parcel and to mark at least two corners on the ground.

I regret to report that while engaged on surveys along the bank of Nahatlatch river, Mr. A. E. Hunter, D.L.S., lost his balance on a high precipice overlooking the river, and was drowned. His body was recovered several days after and brought to his home in Wiarton, Ontario, for interment.

Subdivision surveys of Dominion lands at the present time are much more elaborate than formerly: consequently the rates per mile for surveys under contract are considerably higher. To ascertain how subdivision surveys executed by parties under daily pay compare as to cost with similar surveys under contract, a party under daily pay was employed during the season on subdivision surveys under conditions as near as possible to those under which contract work is carried on. The place selected was a block of townships near Athabaska river, about thirty-five miles northeast of Athabaska. Although the surveyor lost part of his equipment by a canoe accident, and in spite of the fact that considerable time was spent in building roads, the cost per mile of his surveys was below the average cost per mile of surveys in the same district made at contract rates.

It is the intention to introduce a number of improvements in our methods of survey. All section lines in a township will now be surveyed and a few lines of levels run

in each township. The survey of all the section lines will enable the settlers in the more or less wooded districts to find their lines with little difficulty, while the levels will be valuable later in the preparation of drainage schemes, highways and for other purposes.

INSPECTION OF SURVEYS.

The surveys executed under contract have been carefully inspected to determine if the work had been accurately performed and if the charges for doing the work were in accordance with the terms of the contract. Five inspectors were employed for this purpose, and their reports show that the contractors have done their work carefully and in conformity with the requirements.

When inspectors are not engaged on inspection work they occupy their time as far as possible in the performance of subdivision and miscellaneous surveys. During last season one inspector visited the camps of several surveyors in charge of parties under daily pay. He examined their instrumental equipment and their outfits and reported thereon to the office, as well as on the work performed and the general fitness of the surveyor to have charge of survey parties.

INTERPROVINCIAL BOUNDARY SURVEYS.

The delimitation of the boundary between the provinces of Alberta and British Columbia, begun in 1913, was continued last season under the same three commissioners as formerly. Two parties were employed on the survey, one under each of the commissioners appointed by the provinces: one party surveyed the boundary line and erected the boundary monuments; the other made a photo-topographical survey of the country on both sides of the boundary. The representative of the Dominion visited the parties occasionally to keep in touch with the progress of the work and to confer with the other commissioners on questions where difficulties or disputes might arise.

The boundary was established across Crowsnest and North Kootenay passes, and fifty-nine boundary monuments erected. Preliminary survey was commenced at South Kootenay pass.

LEVELS.

During the year four thousand five hundred miles of lines of levels were run, making the total mileage of levels up to the present time, nine thousand eight hundred. A publication is now in the hands of the printers giving in tabulated form the information collected by our surveyors for 7,400 miles of the levels already taken. It is expected that this publication will fill a long felt want, as it will contain much information that will prove invaluable in the development of new areas, in the reclamation of swamp lands, in the extension of railway systems, in the development of water areas and in many other public and private undertakings.

TOPOGRAPHICAL SURVEYS.

The topographical survey of the portion of Jasper park in the vicinity of Jasper, begun in 1913, was continued. The flats of Athabaska and Miette rivers, and the rolling country behind the flats were surveyed for a distance of approximately five miles on each side of the town. The survey was made by means of the plane table, and from the information collected it will be possible to prepare a contour map of the district with intervals of ten or twenty feet. The map will be most useful in planning improvements and public works for the development of the park. The attractiveness of the place is greatly enhanced by the numerous small lakes scattered over the area surveyed.

The topographical survey of Crowsnest forest reserve made at the request of the Forestry Branch was completed, and the publication of the map of the reserve is now being proceeded with. An area of approximately seven hundred square miles was surveyed, comprising the eastern slope of the Rocky mountains southerly from the Canadian Pacific railway to the international boundary. Large deposits of coal occur within the reserve, but only those near the railway are being worked as yet. An oil-well, bored to a depth of 970 feet, yields from fifteen to eighteen barrels of crude oil a day.

Topographical surveys were considerably retarded by high winds and smoke from forest fires. During a season comprising one hundred and twenty-five days, forty-six days were totally unfit for work, while several others were unfavourable to good results.

STADIA SURVEYS.

Twelve parties were employed on stadia surveys of water areas in the portions of Saskatchewan and Alberta, which were subdivided many years ago. At the time of the original surveys many bodies of water existed which have now partially or entirely dried up leaving considerably more land available for settlers. In some instances bodies of water are found which did not exist, or were not noticed by the surveyor when subdividing the townships: in other instances the courses of rivers are found to have greatly altered. Each township is carefully examined by a stadia party, and with the information collected we are able to issue new township plans representing conditions as they are at present. During the year, 605 townships were examined, and 2,733 miles of traverse made by the stadia parties alone.

CORRECTIONS AND RESURVEYS.

In making the subdivision of Dominion lands, wooden posts have been employed to a very large extent. Previous to 1883, iron posts were used to mark township corners only, while from 1883 to 1889 they were also used to mark section corners in prairie, while wooden posts were used in bush. From 1890 to the present all township and section corners have been marked by iron posts. Quarter-section corners were first marked by iron posts about 1908. From this it is evident that up to six or seven years ago wooden posts were very extensively used as monuments.

Although sound wooden posts were invariably chosen, their existence as monuments was of very short duration. They decayed rapidly and were often broken. Again, iron posts are frequently removed by persons, who perhaps do not understand the purpose they serve, or by others who are interested in destroying evidence of the survey. In making improvements, homesteaders often plough over monuments, thus destroying them. The destruction of monuments is an indictable offence punishable by imprisonment. Although a reward of fifty dollars has been offered for evidence of offences, very few convictions have been secured, and the removal of posts and destruction of monuments continue. A form of iron post, which will be much more difficult to remove, is being made at present.

When the survey monuments have disappeared to any considerable extent, new settlers experience much difficulty in determining the limits of their homesteads. Resurvey under the provisions of clause 58 of the Dominion Land Surveys Act are undertaken in townships now being colonized, when investigation shows that such a survey is necessary to determine the boundaries of the various quarter-sections. In townships where a large portion of the land is patented and has passed under provincial jurisdiction, resurveys are not undertaken, as the perpetuation of the monuments, in such cases, is the duty of the owners of the lands.

Surveys of twenty or thirty years ago were not made with the same care and precision as is practised to-day. On examination of those surveys, it is often found that the bearings and chainages are very erroneous, and the area of quarter-sections is

considerably larger, or smaller, than returned by the surveyor. Owing to these irregularities of survey, it often happens that adjoining homesteads differ in area by as much as fifty or sixty acres, which gives rise to much dissatisfaction among the settlers, and litigation often results. Errors in the survey of settled lands can be corrected only under the authority of section 57 of the Dominion Lands Surveys Act.

The Department of Justice has recently ruled that sections 57 and 58 of this Act are not applicable to lands which passed from the control of the Dominion prior to the date the Act was assented to, viz.: March 17, 1908, unless authorized by the Legislature of the province in which the lands are situated. Acts authorizing these surveys have been passed by the provinces of Alberta and Saskatchewan, but up to the present Manitoba has not done so.

Three parties were employed on the resurvey of townships under the provisions of section 58 of the Dominion Lands Surveys Act. Fourteen townships were either wholly or partly resurveyed. These parties also made surveys of a miscellaneous nature, such as extending subdivision lines over the dried-up beds of lakes, which originally covered large areas. They established monuments to mark various corners made accessible by the partial drying up of lakes.

One surveyor with an assistant only, was employed throughout the season in travelling over the country attending to complaints, correcting errors, erecting monuments and making various adjustments which did not involve much work. Towards the close of the season, when their other surveys had been completed, two other surveyors, each with an assistant, were employed at similar miscellaneous work.

The surveys of base lines and meridians made many years ago, when instruments and methods were not sufficiently accurate, are often found to be quite erroneous. Errors as great as twenty-seven chains in distance and seventeen chains in direction have been discovered. In order to determine the exact location of the monuments existing along such lines, a retracement survey is necessary. This work was commenced in the season of 1912, and has been continued during each successive season.

In 1914, one party was employed on the retracement of the second base line (between townships 4 and 5) between the Second and Fourth meridians, and of the Fourth meridian from the international boundary to township 54. This party retraced over 700 miles.

The council of the city of Prince Albert asked for a resurvey of the river lots in Prince Albert settlement. Where most of the lands affected are private property, the usual answer to requests for resurveys in cases of this kind is that the Dominion Government has no interest in the lands and any resurvey that may be required must be made by the province under the authority of the provincial laws.

The case in question, however, was very exceptional. The survey was made a long time ago and the records were imperfect; there seemed to be justification for the departure from the general rule. The difficulties cited by the city council seemed to be due mostly to the disappearance of the marks of the original survey and to imperfections in the plan of the same. It was considered that the proposed resurvey would remove the difficulties.

Accordingly, one party made a retracement survey of part of the settlement and the surrounding townships. They also resurveyed a township under the provisions of section 58 of the Dominion Lands Survey Act, and subdivided a portion of Sturgeon Lake Indian reserve No. 101, which had been surrendered to this department.

LATITUDE OBSERVATIONS.

One party, consisting of a surveyor and one man, observed for latitude on the Fourth meridian near lake Athabaska, at the intersections of Peace river with the Fifth and Sixth meridians, and also on the Sixth meridian near the 23rd base line. For this work the surveyor was supplied with special instrumental equipment including zenith telescope.

SETTLEMENT AND TOWNSITE SURVEYS.

In 1908, the townsite of Churchill was surveyed and the general scheme for the town plot was laid out. The boundaries of the streets and blocks were established but time did not permit the surveyor to subdivide the blocks into lots that season and to post them properly.

A portion of the townsite having been disposed of, it was necessary to complete the work which had been left unfinished.

The trip from Pas to Churchill required from March 11 to April 13. From Pas the party travelled on the Canadian Northern railway to the end of steel, a distance of about 85 miles, and proceeded along the right-of-way, a distance of 155 miles. During this portion of the trip, horses were used, but from that point five teams of five dogs each were used as a means of transport. From ten to thirty miles were travelled each day, depending on the character of the country and the depth of the snow. High winds delayed progress considerably, and Port Nelson was reached about April 1. From there the party went directly across country to Churchill, the usual custom being to follow the coast line. During this part of the trip, they suffered considerably from frost bites as there was a scarcity of wood for fuel.

The return journey was commenced on August 25, and a few days were spent at Port Nelson attending to matters regarding transportation. The party left that point on September 5, and reached North Sydney, Cape Breton, on September 14.

The townsite is situated on a rock and gravel bed. The country around Churchill is quite barren, but there is considerable spruce and tamarack near Churchill river. Grass grows near the edges of the rivers and lakes. The summer season is very short, commencing August 1, and lasting about six weeks. The spring is cold and wet, snow storms occurring during June.

One party was engaged in surveying settlements along Mackenzie river at Forts Providence, Wrigley, Simpson, Norman and Good Hope, at Hay river and Fort Resolution, which are situated near Great Slave lake, and at Pelican settlement on Athabaska river. Most of the inhabitants of these places are Indians and half-breeds, whose chief occupation is hunting. The party engaged at this work remained in the field from the spring of 1913 to the fall of 1914.

Winter sets in early in the northern country, and Mackenzie river was completely frozen over on November 18. When the ice is forming, drift-ice piles up in huge masses wherever the current is swift, and then becomes frozen solid. This forms an extremely rough surface for dog teams to travel upon. The surveyor had to cut several miles of trail through the ice, often necessitating the making of a road through walls of ice, eight feet high and four feet thick. During the months of January and February, the temperature varied from 30° to 60° below zero, and no surveying was done. During this time the surveyor and assistant were employed at the preparation of returns, while the men secured wood for fuel, which was scarce and had to be brought a considerable distance.

During the summer the climate throughout the north is ideal, and is not liable to sudden changes. The weather is very warm in July and August, but there is sufficient rainfall to keep the ground in excellent condition for the growth of grain and vegetables. The wet season extends from the latter part of August to the middle of September, when frosts occur frequently, and snow falls occasionally at the end of August.

Moose, caribou, and bear are quite plentiful, while mountain sheep and goats roam over the mountain slopes. During the summer season, ducks, geese, ptarmigan, and partridges can be obtained with but little difficulty Fish in abundance may be had in all bodies of water of any considerable size. Splendid whitefish, trout, pike and many other varieties are very plentiful in Mackenzie river and in Great Bear and Great Slave lakes.

At all the points visited, all vegetables, excepting tomatoes and melons, are successfully grown. They attain good size and are of splendid quality. Even at Fort Good Hope, on the verge of the Arctic Circle, splendid gardens were seen. Raspberries, cranberries and blueberries grow in abundance throughout the north. Farming is carried on to a small extent at Forts Resolution, Simpson, and Hay River, where wheat and oats have been successfully raised. Barley and oats are grown at Fort Providence, and barley at Fort Norman. A well-equipped saw-mill is located at Fort Resolution, and another at Fort Simpson. These furnish shingles and lumber for the inhabitants. The R.N.W.M. Police have detachments stationed at Forts Resolution and Simpson. Besides preserving order, they assist the fire patrols, and forest fires are now decreasing in number. A large mission school, where Indian and half-breed children are educated, is conducted at Fort Providence. Copper deposits exist in the vicinity of Forts Resolution and Good Hope, and galena has been found near Fort Resolution.

At the request of the Dominion Parks Branch, many surveys of a miscellaneous nature were made in the Yoho and Rocky Mountains parks. One party was engaged on this work throughout the season, and another for a few months. Various road location surveys were made, and levels taken in the vicinity of Banff, Field, and Lake Louise. The Calgary-Banff automobile road was traversed, and levels taken for a distance of twenty-two miles. Cemeteries were laid out at Bankhead and Field; Canmore townsite was re-surveyed. Surveys of the villa-lot section and the townsite at Banff, commenced last season, were also continued. This work was made to conform with designs submitted by Mr. Mawson, town-planning expert.

TIMBER BERTHS.

Under the present regulations, timber berths are surveyed by the department before they are offered for sale. The cost of the survey in each case is included in the upset price of the berth. During the season, three berths were surveyed, according to instructions issued from this office, necessitating the establishment of approximately twenty-three miles of timber-berth boundaries. Two of these berths were surveyed by surveyors employed under daily pay. Tenders were received for the survey of the third, and the work was allotted to the surveyor submitting the lowest tender.

MINERAL CLAIMS.

Every mineral claim is designated by a lot number in the group to which such lot belongs. The claimant, after staking his claim, is required to apply to the Surveyor General to have instructions issued to a Dominion land surveyor to have the boundaries of the claim run out, measured, and marked on the ground. Lot and group numbers for the claim are furnished with the instructions. After completing the work on the ground, the surveyor must forward to the Surveyor General a plan of the claim on tracing linen, together with complete field notes. He must furnish, as well, the necessary duplicates, the plans for filing with the mining recorder and for posting on the claim.

During the past season, surveys were made of sixty-seven mineral claims, nine being located in the Yukon territory. Returns were also received for eight mineral claims surveyed in 1912, and for thirty-six surveyed in 1913. All of these were located in the Yukon territory, and the survey returns were not completed in time for previous reports.

YUKON SURVEYS.

Dominion land surveys in the Yukon territory are under the direction of a Director of Surveys who has his office at Dawson; he has a staff of two draughtsmen. During the year, 113 miles of base lines and traverses were surveyed. The work was mostly in connection with mining claims.

STATEMENT OF MILEAGE SURVEYED.

The following is a comparison of the mileage surveyed each year since 1912:—

Nature of Survey.	April 1, 1912, to March 31, 1913.	April 1, 1913, to March 31, 1914.	April 1, 1914, to March 31, 1915.
	Miles.	Miles.	Miles.
Township outlines	2,718	3,760	3,270
Section lines	10,365	7,918	7,100
Traverse	3,505	5,748	5,141
Resurvey	2,586	1,632	2,610
Total for season	19,178	19,058	18,055
Number of parties	72	66	59
Average miles per party	266	289	307

The following tables show the mileage surveyed by the parties under daily pay, and by the parties under contract:—

WORK OF PARTIES UNDER DAILY PAY.

Nature of Survey.	April 1, 1912, to March 31, 1913.	April 1, 1913, to March 31, 1914.	April 1, 1914, to March 31, 1915.
	Miles.	Miles.	Miles.
Township outlines	1,619	2,074	2,088
Section lines	1,358	1,695	1,756
Traverse	992	4,179	3,987
Resurvey	2,538	1,613	2,538
Total for season	6,507	9,561	10,369
Number of parties	35	39	41
Average miles per party	186	245	255

WORK OF PARTIES UNDER CONTRACT.

Nature of Survey.	April 1, 1912, to March 31, 1913.	April 1, 1913, to March 31, 1914.	April 1, 1914, to March 31, 1915.
	Miles.	Miles.	Miles.
Township outlines	1,099	1,695	1,514
Section lines	9,077	6,214	5,012
Traverse	2,517	1,569	1,154
Resurvey	48	19	6
Total for season	12,671	9,497	7,686
Number of parties	37	27	18
Average miles per party	342	352	427

Owing to the nature of their work, twelve parties are not included in the statement of mileage for the year ended March 31, 1915.

COST OF SURVEYS.

The following statement shows the average cost per mile of surveys executed by surveyors under daily pay, and by surveyors under contract:—

	Surveyed under daily pay.	Survey under contract.
Total mileage surveyed	10,369	7,686
Total cost	$504,950 00	$229,303 00
Average cost per mile	48 70	$29 83

CORRESPONDENCE.

The correspondence consisted of: letters received, 14,067; letters sent, 17,502.

ACCOUNTS.

Number of accounts dealt with, 1,710; amount of accounts, $1,046,910; number of cheques forwarded, 3,450.

OFFICE WORK.

(T. Shanks, Assistant Surveyor General.)

For some years the organization of an efficient office staff has been seriously interfered with owing to the frequent changes in the personnel of our technical officers. It was felt that this was largely due to the activity in general surveying and engineering work, which provided employment with better remuneration and brighter prospects for men who were qualified by special training in technical schools or by experience in practical work. When conditions changed in the business world, it was expected that the office staff would tend to become more permanent in nature. This

may be the result eventually, but up to the present the improvement has not been noticeable. During the past year fourteen clerks have severed their connection with our office. Three left to resume their studies at the university, four preferred field work to office work, one accepted a more attractive position elsewhere, and six were transferred to other branches or departments of the service. Fourteen men were selected by the Civil Service Commission to replace them but, while possessing the necessary educational qualifications, the new men lack the training and experience of the clerks who have gone.

To add to the difficulties caused by the unsettled condition of the staff, the office has suffered the temporary loss of twelve clerks who have enlisted for active service in the European war. Nine of these went with the first contingent and three with expeditionary forces that were recruited later. Additional recruiting will undoubtedly lead to the temporary loss of others willing to respond to the call of duty.

There has been no relaxation in the prosecution of our field work during the past year. For some time, when the flood of immigration was at its highest, there was some difficulty in carrying on field operations so as to keep ahead of the rapid development in western Canada. A sufficient number of properly qualified surveyors could not be obtained as the remuneration offered in other branches of engineering was more attractive. At present, with the exception of a few localities, the surveyors are well ahead of settlement and it is no longer difficult to obtain efficient technical assistance in carrying out our field work.

The completion of township subdivision in those districts where it had been urgently required owing to the demands of settlement, enabled the department to devote some attention to several branches of the field work which had been neglected owing to the pressure of other work. Among the divisions of the work now receiving greater attention are resurveys, stadia surveys of water areas, the securing of magnetic and astronomical data, and the taking of levels.

The resurveys are chiefly for the purpose of re-establishing corners where the original monuments have disappeared and for the correction of errors in the old surveys. These resurveys increase in difficulty with the advance in settlement. The aim of the department is to assist the homesteaders to find their true corners, but in some cases the owners of adjoining lands object to the resurvey and an awkward situation results. In other cases municipal or private improvements may have been made which would be affected by the re-establishment of the corners in correct position.

Stadia surveys of water areas have been rendered necessary by the great changes in these topographical features since the original surveys were made. In many cases areas shown on the old maps as lakes are now being subdivided into homesteads. In other cases the opposite change has taken place, and lakes which have all the appearance of being permanent are in existence over areas which were once shown as dry land. Frequently an additional reason exists for these surveys owing to the unsatisfactory nature of the water boundaries for the purpose of accurately defining the land to be granted. This difficulty does not arise where the bank is a permanent feature, but where it is subject to change it has been found advisable to substitute straight lines whose positions can be definitely located.

The work of levelling and the collection of magnetic and astronomical data can be done by our field parties at very little extra expense while carrying on the ordinary land surveys, and afford a means of securing much information of great value both from a practical and a purely scientific standpoint.

The change in the general nature of the field work and the wider scope of the investigations carried out by our survey parties have resulted in a corresponding change in the character and amount of the office work. In the earlier days of the branch the surveyors were employed principally in the subdivision of townships into sections. The office work in preparing instructions and examining survey returns was comparatively simple. The varied nature of the present surveys and the complicated

problems to which they give rise have created a greater need for a competent and permanent staff familiar with all the intricacies of our work.

The miscellaneous or routine business of the office continues to increase. This covers such points as inquiries about the nature and capabilities of the districts surveyed, information as to the character and extent of the surveys made or proposed, correspondence and action in connection with petitions for the re-establishment of lost corners, the renewal of monuments in poor condition, the correction of actual or supposed errors in survey lines, and the furnishing of information about areas, corner monuments, etc.

Details of work in the different divisions are given in the reports below by the several chiefs, and the usual schedule of work executed during the twelve months is added in Appendix No. 4.

DIVISION OF SURVEY INSTRUCTIONS AND GENERAL INFORMATION.

(H. G. Barber, Chief of Division.)

The work of the division consists, in general, of the preparation of instructions for the surveyors who are engaged in the field operations, the entering of all survey returns in the various registers, the issuing of all preliminary plans except for the townships in the Railway Belt of British Columbia, the answering of requests for information received from the general public and from other branches and departments and the issuing of the annual report of the branch.

During the twelve months just ended the total number of draft letters and memoranda was 9,592, an increase of more than fifteen per cent over the preceding year.

Two hundred and fifty-seven drafts of instructions were issued to surveyors for the execution of various surveys; this involved the preparation of 3,410 sketches and 103 maps and tracings.

Two thousand two hundred and nineteen communications from settlers and others and inquiries from other branches and departments were dealt with. This necessitated the preparation of 455 sketches, 179 maps and plans and the copying of 345 pages of field notes. Two thousand and ninety-five sketches were also copied for the information of other branches.

Thirty descriptions of parcels of land were drafted and a number checked and revised for other branches.

Preliminary plans were issued for 275 townships. These plans allow of the land being opened for entry at once without waiting for the final examination of the surveyor's returns and the issue of the official plans. Four copies of each plan are required. Up to the present time this division has prepared these plans for all townships in Manitoba, Saskatchewan and Alberta, those for the townships in the Railway Belt of British Columbia having been made by the British Columbia Division of the branch. It has recently been decided that in future all preliminary plans are to be issued by this division. As six copies are required of each of the British Columbia plans, this will mean a considerable increase in the work of the division.

Plans of 948 townships and of thirteen townsites or settlements were received from the lithographic office, entered in the various registers and forwarded to the Survey Records Branch. Seventy-three sectional maps and 105 miscellaneous plans were also received and distributed.

During the year there were received from the surveyors in the field and entered in the office registers: 1,600 progress sketches, 382 books of field notes for townships surveys, 440 books and 1,111 plans for miscellaneous surveys, 251 timber reports, 229 statutory declarations, sixty books of azimuth observations in connection with the survey of block outlines and returns for magnetic observations and for seven timber berths. General reports were received from all the surveyors under daily pay.

Their examination having been completed, 574 field books of township surveys and 206 books and 180 plans of miscellaneous surveys were placed on record.

For reference in the work of the office there were received from the Survey Records Branch 5,657 field books and 1,046 plans and from the Registration Branch 1,968 files.

The preparation of the third edition of the pamphlet entitled "Description of the surveyed townships in the Peace River district in the provinces of Alberta and British Columbia" has been commenced. It is expected that it will be issued in a few months. More than two thousand copies of the second edition were distributed during the year.

After having been laid aside for some time through pressure of work, the preparation of a complete list of all the maps and publications which have ever been issued by this branch has again been put in hand. It is hoped to have this completed in a short time.

From topographical maps prepared last year schemes of subdivision for the summer resorts at Clear lake in Riding Mountain forest reserve, and at Madge lake in Duck Mountains forest reserve No. 2 were laid out and instructions for the surveys issued. At Banff an extension was made to the subdivision in the villa-lot section in accordance with the design prepared by Mr. Mawson, the expert on town-planning. Plans of each of the seventeen blocks, on a scale of twenty feet to one inch, were made and from these all the information necessary for the execution of the survey was calculated. On the completion of the survey at Banff, the surveyor's returns were examined and a plan of the subdivision was compiled for publication. A plan was also prepared showing the topography of the south and west slopes of Tunnel mountain at Banff. The returns of the survey of the townsite of Woodhaven, on Bedwell bay, in fractional township west of township 39 west of the Coast meridian, were examined, and further instructions for this subdivision were prepared.

During the year four members of the staff of the division resigned and two were transferred to other branches. Three of these vacancies have been filled and it is expected that another will be filled shortly. This will bring the strength of the permanent staff to twenty-two which is two less than it was during the preceding year. In addition to this there are at present two temporary technical clerks.

DIVISION OF EXAMINATION OF SURVEYS.

(T. S. Nash, Chief of Division.)

The work of this division comprises the returns of survey of Dominion lands in Manitoba, Saskatchewan, Alberta, the Yukon and Northwest Territories, and in British Columbia, excepting township subdivision in the Railway Belt.

In addition to examining the correctness of the returns, all the required official plans are also prepared in this division.

Surveyors in the field are required to submit, from time to time, sketches showing the progress of their work. These are examined to see that correct methods are being employed and that satisfactory results are being obtained; 100 progress sketches from inspectors, 285 from contractors and 1,027 from men employed by the day were examined.

The investigation and retraverse of lakes and former lake beds by stadia was continued by twelve surveyors, and has now become established as a part of the work.

Owing to the staff being shorthanded, and to the desirability of issuing the amended township plans with as little delay as possible, these stadia surveyors were again permitted to prepare from their field notes the amended township plans. Their field notes and the township plans have been checked by the regular staff; 103 field books and 697 plots comprised the final returns of stadia surveys in 541 townships.

Including these stadia surveys, examination has been made of 810 subdivisions.

133 miscellaneous surveys and 563 township outlines. Memoranda on examination of returns were sent to the number of 349, and 325 replies were received and the necessary corrections made. The number of draft letters prepared was 2,254. Thirty contract accounts were prepared and closed as the work was shown by the inspectors' reports to be satisfactorily done. Compiled plans of 833 townships were completed, 248 of which were first edition plans. Compiled plans of 13 miscellaneous surveys and 11 settlements were also completed.

With regard to the Yukon Territory, sixty-two group lot surveys and seven base line and reference traverses were received and examined. Eighteen additional sheets of the Yukon map in the Stewart river district are almost completed.

Mineral claim surveys from the Beaver lake district in northern Saskatchewan have been dealt with to the number of forty-four, from Hudson bay thirty, and from other parts nine.

Inquiries from other branches of the department involved the writing of 324 memoranda, the preparation of 196 sketches and the calculation of 614 areas. The returns of seven timber berth surveys were examined and two timber berth plans prepared.

Plans of road diversions submitted by the provincial governments to the number of 541 have been examined and sent to be recorded. Of railways, eighty-five plans of right of way were examined, representing 3,045 miles of line. As two or more copies of many of these plans were submitted, the gross mileage of plans examined was 4,886.

The numerical strength of the staff which was formerly twenty-nine, is now reduced to twenty-four, of whom two have been on active military service since last August, and two have been absent on account of protracted illness.

DRAFTING AND PRINTING DIVISION.

(C. Engler, Chief of Division.)

Township Plans.

The preparation for printing of township plans constitutes the most important part of the work and takes up most of the time. During the year, 833 township plans have been prepared. Areas of lands patented are now omitted, so that as settlement proceeds the plans become simpler as regards areas shown. As the prepared copies after being photographed are filed for use in subsequent editions, and as we have now a large number of such copies, the work of preparing later editions is in many cases reduced; in others the changes required for the later editions are such as to call for complete new copies.

Closely connected with the preparation of plans of complete townships are occasional plans of small portions of them. These are asked for when it is desired to deal with a part of a township, and for some reason it is impossible to deal with the whole. An edition of such plans is not printed, but from four to six copies are made by hand.

The first plans of townships printed by the department were in colours to show topography. The editions of many of these have become exhausted, and it is necessary to reprint them. In some cases this has been done by simply photographing a print of the old edition, but where the colours do not permit of this being done the black portions of the plans are redrawn, photographed and printed, and the colours are then printed in the usual way.

Miscellaneous Surveys.

Twenty plans of such surveys were prepared. They include settlements, townsites, and subdivisions of which editions were printed, but do not include the occasional copies of plans made by hand for various purposes.

Surveyors' Sketch Maps.

In former years, our practice has been to print the sketch maps showing a surveyor's explorations for twelve miles on either side of base lines or meridians on a scale of six miles to an inch with an accompanying profile of the line on a vertical scale of 1,000 feet to an inch. The number of such maps has been increasing every year so that at last our facilities for printing them were greatly taxed; the cost of the paper was also a considerable item. It has therefore been decided to reduce the scales of these maps so that for the present issue they may be printed all on a single sheet, the horizontal scale being 12·5 miles to an inch and the vertical 2,000 feet to an inch. It may be remarked that while this reduction in scale saves printing and paper it increases the draughtsman's troubles as there is scarcely room for putting down legibly all the data to be shown. These maps are issued with the report of the branch.

Miscellaneous Work.

This department of the work is increasing every year and as each part of it requires individual treatment, the amount of time required is considerable. It includes fourteen plans to accompany Orders in Council, the mounting of seventy-six maps and the completing of 176 jobs of a miscellaneous character. The astronomical field tables have been rearranged and are now printed on three small folders instead of one as formerly.

BRITISH COLUMBIA SURVEYS DIVISION.

(E. L. Rowan-Legg, Chief of Division.)

The work of this division consists of the preparation of preliminary plans from sketches sent in by surveyors, showing the progress of their work in the field, the examination of surveyors' field notes and plots, the compiling of township and other plans, the comparing of fair copies of township and other plans and replying to requests for various information.

The work done has been as follows: Preliminary plans compiled, 107, and copies made, 180; surveyors' field notes of subdivision surveys examined, thirty-two, and plots fifty-one; mineral claims, eight; field books of miscellaneous surveys, seven, and plans twenty-six; township plans compiled, seventy-two; miscellaneous plans compiled, ten; townsite plans compiled, one; fair copies of compiled plans compared, eighty-three; various plots and sketches made, 228; odd jobs and requests for various information dealt with, 677; draft letters and memoranda written, 608.

In June, 1914, the inspector of surveys in the Railway Belt, British Columbia, reported that the field book in use was inadequate, as it did not contain more than one-third of the notes taken in the field.

Specimen pages for a new book were prepared and sent to the surveyors for their opinions and for suggestions for the improvement of these pages.

The surveyors were unanimously of the opinion that the proposed books would be a distinct improvement on the old ones, and they offered some valuable suggestions, which were acted upon in the preparation of the new books.

To replace the old book, these new books have been prepared, one for final returns, one for field use, and one for the recording of astronomical and magnetic observations.

The pages for field notes in the books for final returns and for field use are designed to contain the notes of either a section or a quarter-section boundary, and are ruled into squares to facilitate the recording of topographical features.

The opposite page is ruled to contain data for the calculation of horizontal and vertical distance.

Both books contain pages for calculation by latitudes and departures.

The book for field use contains blank pages interleaved for calculations appertaining to the field notes or the latitudes and departures. Waterproof detachable covers are provided with these books.

The book for recording astronomical and magnetic observations is made of pocket size, and contains ruled forms for entering observations for time and azimuth on the sun and stars and for variation of the compass needle.

Much time and thought were given to the preparation of these books so as to make them as complete and useful as possible.

The staff of this division has been reduced to four, one being absent on active military service.

SECTIONAL MAP DIVISION.

(J. Smith, Chief of Division.)

Compiling Room.

The compiling of new sectional maps and the revision of those already issued in order to keep them up-to-date, forms the chief work of this room. During the year, seven new sheets were compiled, and revised editions were prepared of fifty-five sheets. Plotting is done on a scale of two miles to one inch, and every effort is made to secure all available information.

The chief sources of information are the following:—

(1) Township plans, settlement plans, townsite plans, etc.; also field books and reports sent in by surveyors. Eight hundred and seven such were examined during the year.

(2) Railway location and construction plans on file with the Railway Commission. Eighty-seven plans were borrowed and used during the year. The working time-tables of the railroads were also searched for names and positions of stations.

(3) Until this year information relative to the positions of post-offices was furnished by the officials of the Post Office Department on cards supplied for the purpose. A new method is now being employed. When a sectional map is about to be revised a diagram is made out for each post-office and mailed direct to the postmaster with a request to check it over and make any corrections necessary. Considerable correspondence is involved, but the results are proving satisfactory. Four hundred and two of such cards and diagrams were received, and the information plotted.

(4) Seventy-nine plans and blue-prints of Indian reserves, forest reserves and Dominion parks were received and used in compilation.

(5) Road diversions are being constantly made by the provincial governments, and plans of these are filed with the Survey Records Branch. Four hundred and twenty-seven such plans were received and plotted.

(6) Valuable information was secured from sketch maps furnished by baseline surveyors and from maps and reports of the Geological Survey, Irrigation Branch, Chief Geographer's office, etc.; for sheets lying partly in British Columbia, maps published by the Government of that province were searched. Three hundred and sixty-eight of these miscellaneous maps, sketches and reports were utilized.

In addition to the work outlined above, this office compiles and edits the yearly pamphlets containing reports of surveyors. Reports received from surveyors from July 1, 1913, to July 1, 1914, were compiled and sent to print and have since been

issued in five pamphlets, totalling 208 pages. Work was also begun on the pamphlets containing reports for the period from July 1, 1914, to March 31, 1915.

Since the initiation of the surveys of Dominion lands, surveyors have been required to make reports on townships covered by their surveys. In 1886 the reports received up to that time were issued in five pamphlets. From that date until 1903 the township reports were not issued at all. In 1903 they began to be printed as part of the annual report of the Topographical Surveys Branch, and since 1909 they have been published in yearly pamphlets.

It is proposed now to combine into volumes of convenient size all the township reports received to date, and it is estimated that twenty volumes of about 250 pages each will be required. The first of these, comprising all reports on townships east of the Principal meridian, has been compiled and sent to the printer; another is ready to send, and two others are in hand.

The work of examining the sketch maps sent in by base-line surveyors which was formerly done in another division of the branch was taken over by this division in November, and has since that time kept one man constantly employed. Thirty-four such sketch maps have been received and examined and compared with the surveyors' field notes. Tracings of these have also been made for blue-printing.

Mapping Room.

The usual work on the sectional maps has been continued.

Eight sheets have been reprinted without being revised, fifteen sheets have been revised and reprinted, and fourteen new sheets, covering an area of about fifty-one thousand square miles have been published.

A map of "Banff and vicinity," was also prepared and published on a scale of one mile to an inch; this map shows the Bow valley, and adjacent country from "The Gap" to Castle mountain.

A map defining the boundary between British Columbia and Alberta, on a scale of one mile to an inch, is being made but is not yet completed.

The permanent staff consists of eighteen clerks, an increase of two over that of last year.

SPECIAL SURVEYS DIVISION.

(G. Blanchard Dodge, Chief of Division.)

Base Line Surveys.

The investigation of base lines and meridians for the purpose of locating and correcting errors of survey has been continued, and a surveyor has been employed in the field in retracing lines on which errors have been found to exist.

This work was begun in 1912 after it became known that some large errors existed among the older surveys in and around Manitoba, and the work has since been gradually extended to include all base lines and meridians so far surveyed. This work has been considerable, for in order to make the investigation of the bases and meridians complete many outlines in addition required to be examined, and the bases and meridians alone aggregate some 19,000 miles. For areas covered by recent surveys this work can be done with comparative rapidity, but among the older surveys, where measurements were not always accurate and entries in the surveyors' field notes often purely conventional, the work is multiplied many times.

On all the bases and meridians, complete returns of survey require to be examined, correspondence files read, theoretic as well as chained distances computed, bearings examined and deflections computed, corrections for elevation above sea-level and for latitude applied, block closings checked, results of latitude observations compared with the results of line surveys, widths of fractional ranges computed, chained lengths of bases between meridians compared with corresponding theoretic lengths, and finally the location, magnitude, direction and cause of any errors determined.

From the results of this work, sketch maps are in course of preparation showing the positions on the ground of all surveyed bases relatively to where they should be, and the differences in latitude between surveyed, theoretic, and sea-level values of each. In this way the framework of a system of control is being formulated which it is hoped will prove efficient.

Besides the investigation of base lines already run, this work includes also the draughting of technical instructions to surveyors making surveys of new bases and to surveyors making retracements of old lines for the purpose of locating or correcting errors.

Astronomical Work.

Azimuth Observations.—During the year the observations for the azimuth of base lines and meridians taken during the season 1913 and 1914 have been received and examined. The same high degree of accuracy found in the returns of the previous year is shown in these results. The errors existing in the bearing of the line are now very small, seldom more than 10″, this being due to the frequency with which observations are taken, the accuracy of the observations, the care taken in applying the correction and the precision with which the line is run.

The new base-line transits are well adapted to the work. The horizontal circle is graduated every 5′ and is read by two micrometer microscopes having a magnifying power of about 53. The micrometer head is divided into 60 equal parts, each division corresponding to 5″ and the readings are estimated to seconds. The telescope is fitted with a micrometer eye-piece. As this eye-piece can be rotated in a plane perpendicular to the optical axis of the telescope, it may be conveniently used for measuring both horizontal and vertical small angles such as for azimuth observations when running a meridian, the telemetric measurement of distances and for latitude observations by Talcott's method. Azimuth observations are generally taken in daylight, but for latitude or other work desired at night the instrument is fitted with a complete system of electric illumination. A full description of the instrument is in course of preparation, and will be published in monograph form.

Latitude Observations.—Checks on the positions of base lines in the district between lake Athabaska and British Columbia were required, and a surveyor took observations for latitude with the zenith telescope at four points therein. The results of these observations when checked and the necessary computations made, were found to be satisfactory. No large errors were found to exist in the latitudes of the bases.

Astronomical Field Tables.—The astronomical field tables for the year have been prepared and issued. The field tables were first issued in 1903, when they were made out for periods of six successive months; they were set up in type and printed on a single sheet of strong paper, fifteen by six inches, folding to three by six inches for the pocket, and contained a table for finding the pole star and the astronomical meridian, a list of time stars, a table of the sun's apparent right ascension, a small map showing approximate magnetic bearings of astronomical north in western Canada, and diagram showing at a glance the latitude, longitude, and convergence of meridians for any point of the system up to township 80. It was then thought that the field tables would greatly simplify the taking of astronomical observations for azimuth. They were greatly appreciated by surveyors and were soon found to make possible a distinct increase in the accuracy of subdivision surveys. They are now of such service to surveyors as to be considered indispensable. Numerous changes have been made since their first appearance however. Each set of tables for the azimuth of Polaris is now made to cover either two periods of three consecutive months or three periods of two consecutive months in successive years. The reason for this is that the position of Polaris for a given period in one year is approximately the same as its position for a different period in the preceding or following year, so that by a judicious combination of months in different years a great increase in the accuracy of the tables is obtained.

The gradual northward advance of settlement, which of course must be preceded by the surveyors, has necessitated the tables and diagrams being extended as far north as township 140, and the better class of instruments now used has made desirable the addition of many stars of the second and third magnitude to the list of time stars.

Delay in issuing the tables is avoided by having prepared special printed forms on which the variable matter of the tables is stamped as soon as obtained from the computing office, and the finished table is then reduced and printed by photo-zincography.

As explained in last year's report, if is now necessary to issue the field tables in two sets, one set giving data for the reduction of stellar observations, and the other giving data for solar observations. Each is printed on sheets of strong paper, sixteen by six inches, folding to pocket size of four by six inches.

The diagrammatic map giving the astronomical bearings of magnetic north in western Canada is now omitted from the field tables. It was necessarily of a very rough and approximate nature, as until recently very little information has been available on this subject. The large amount of data respecting magnetic declination at points in the western provinces, which have been obtained from surveyors in recent years, has made possible a much more accurate representation of the isogonic lines over western Canada. A map has been compiled on a much larger scale than the former one, showing the results of this magnetic work. It is printed on stiff cardboard of convenient pocket size.

The extension of the tables for the azimuth of Polaris, and the peculiar effects which the phenomena of precession and nutation have upon the apparent motion of Polaris, have made necessary an investigation into the accuracy of the tables as they are now presented, and the advisability of increasing their accuracy by some radical change in the form of the tables. This has been done during the year. The maximum error of the tables for township 140 exceeds half a minute on only a few days of the year, and for but a few hours on each of these days. At all other times the error is well under half a minute. The errors for the more southern townships are less than for township 140; thus, the errors of the tabulated figures for township 80 rarely approach and never exceed half a minute of arc, while those for townships farther south are still less. This gives a sufficient accuracy for ordinary subdivision and traverse work, and it was therefore decided that no change in the field tables is yet required. It has also been shown that any desired increase in the accuracy of the tables could only be obtained by adopting a much less convenient arrangement than the present one, or by greatly increasing the frequency with which the tables are issued, with a consequent increase in the computing. Some such change may become necessary in the future.

Magnetic Survey.

Fifty surveyors were instructed to observe for magnetic declination and during the miscellaneous surveys made by R. C. Purser, D.L.S., observations for magnetic dip and total force were taken at twelve stations. The results are given in Appendix 62.

During the season of 1913, R. C. Purser, D.L.S., and G. A. Bennett, D.L.S., were both engaged in taking observations for magnetic dip and total force, but this season owing to the nature of his work, Mr. Bennett was not available. This accounts for the smaller number of observations taken this year.

Every observation for magnetic dip and total force consisted of a dip, a total force, and a dip, the mean dip being used in working out the total force. This complete observation was duplicated at every station, and the average range found to be comparatively small. The instrument used was a Dover dip circle, the total force constant of which was determined both at the beginning and end of the survey season. This constant was the mean of at least six observations, and the probable error in each case was less than ·0001 c.g.s.

The index correction to the compass of every transit used for observing was determined both at the beginning and end of the survey season. If a serious discrepancy was found between the two determinations, it was investigated, and unless the discrepancy could be satisfactorily explained, the observations taken with the instrument were rejected. Every observation for magnetic declination has been checked and plotted on a large-scale map. They also have been reduced to the mean of the month in which they were taken, by means of the daily records of the declinometer at Agincourt, except those that were taken at times when the records were not observed. In the appendix, those observations that are not reduced to the mean of the month are marked by an asterisk.

Returns of magnetic declination received to date for 1914	1,439
Previous returns since 1908	5,414
Total returns to date	6,853
Dip observations received for 1914	62
Previous returns since 1908	289
Total force observations for 1914	46
Previous returns since 1908	214

Surveying Instruments.

The instrumental equipment of the surveyors employed in the field was inspected during the year, and those whose equipment was not satisfactory were required to provide themselves with approved instruments.

Repairs were made to fifty-five transit theodolites, twenty-seven dumpy levels, twelve surveying aneroids, one zenith telescope, six rod levels, nine cameras, two stadia rods, three precise levelling rods, and three clinometers.

Thirty-three sidereal watches and one box chronometer were overhauled and readjusted.

The surveying instruments shipped during the year comprised 285 packages weighing 15,126 pounds, while 225 packages weighing 12,732 pounds were received.

A statement of the surveying instruments on hand on March 31, 1915, showing also the instruments purchased and sold during the year, is given in Appendix 64.

Surveys Laboratory.

The regular work of the Surveys Laboratory during the past year has included complete tests of one block survey transit, forty-two D.L.S. subdivision transits, one alidade, and six levels. Partial tests were made of one block survey transit and twenty-eight D.L.S. subdivision transits. The index corrections of nineteen aneroids, the value per turn of five microscope screws, the linear distance between cross hairs of four extra diaphragms, and two level values were determined. Besides the above, thirty-eight sidereal watches have been submitted for trial.

For the past two years a number of parties have been engaged in the field in making traverses of lakes. The stadia has been found to be the most rapid and convenient method of doing this work, and has been used exclusively. The stadia constants of each instrument used are determined at the Surveys Laboratory, and stadia correction tables were computed and printed for the use of the surveyors in the field. Fifty-one such cards in all were printed.

In connection with the testing and rating of the watches and laboratory time pieces, twenty-seven time observations were taken.

Of the thirty-eight watches tested, twenty-six were new and twelve had been previously tested, rejected, and returned to the makers for readjustment. There were fifteen watches which passed the test, seven of them being new and eight old, i.e., thirty-nine per cent passed as against fifty-seven per cent in 1914.

The results of the trials of the fifteen watches which passed are given in Appendix 63.

The watches tested and supplied to surveyors are cheap ones, costing only $45. Better watches are not procured because it is inevitable that in the course of a surveyor's operations the watch may be submitted to extreme cold, and the finer watches would become no better than the cheaper ones. The conditions of the test were given in our report of last year. All watches which are successful in passing the "Standard of Test" are given marks for isochronism, position, adjustment, and temperature compensation as follows:—

With the theoretically perfect watch α would be $= 0$ and would get 400 mks.
β " $= 0$ " " 400 "
γ " $= 0$ " " 200 "

A watch which had just succeeded in passing the "Standard of Test" would have:—

$\alpha = 0.75$ and would get 0 marks.
$\beta = 3.5$ " " 0 "
$\gamma = 0.3$ " " 0 "

Denoting by X, Y, Z, the corresponding numbers merited by the watch

$$X = \frac{1600}{3}(0.75-\alpha)$$
$$Y = \frac{800}{3}(3.50-\beta)$$
$$Z = \frac{2000}{3}(0.30-\gamma)$$

and the total marks for the watch:—

$$S = X + Y + Z.$$

For the fifteen watches which passed, the average errors for isochronism were as follows:—

P.U.	P.R.	P.L.	D.U. 40°	D.U. 65°	D.U. 90°	D.D.	P.U.
0s.54	0s.53	0s.54	0s.65	0s.53	0s.52	0s.41	0s.54

The smallest error for α was 0s.41.

The average errors for position were:—

P.U.	P.R.	P.L.	D.U.	D.D.
1s.53	2s.68	3s.02	1s.43	1s.49

The smallest error for β was 1s.23.

The average temperature coefficient was 0s.08, two watches have coefficients of only 0s.02.

Comparing the average errors of the watches which passed with those for 1913 and 1914, we have the following:—

—	1913.	1914.	1915.
Average error for isochronism	0s.59	0s.45	0s.53
" " position	2·58	2·03	1 89
" " compensation	0·14	0·10	0·08

As noted in 1914, the lowest average error in isochronism for both the watches which passed the test and those which failed was in the D.D. position. The largest average error in isochronism is for those which passed, as in 1914, in the P.U. position, but for those which failed, the largest error is in the P.R. position. In position, the largest average both for those which passed and those which failed is in the P.L.

position. Of the twenty-three watches which failed: four, or seventeen per cent, failed in isochronism; fourteen, or sixty-one per cent in position; and five, or twenty-two per cent, in both isochronism and position. All passed the test for temperature compensation.

At the Comparator building, the lengths and weights of ninety-four tapes of all kinds, and two invar wires were determined. Fifty-eight intercomparisons of the laboratory standards were made, and two precise levelling rods were tested.

The comparator base was verified twenty-five times by the standard four-metre rule. The first verification was made in September, and they have been made at regular intervals of time since. They appear to show a regular long period change in the length of the base. When a longer interval of time has elapsed we will be in a better position to make a study of this change.

The work of improving the apparatus has been carried forward as far as time would permit. At the Surveys Laboratory besides minor improvements, an air pump of the water-jet type has just been installed whereby reduced pressures may be maintained for extended periods in the air receiver. This apparatus will enable a more thorough examination of the behaviour of aneroid barometers to be made than has been hitherto possible.

When the Comparator building was erected, the intention was to heat it by gas. This has been tried but has not proved a success. The fumes from the gas affected the apparatus and made the room very trying to work in. It was decided therefore to try electric heating. The full system consists of heaters and automatic control. At the present time, we have only the heaters. But even this is a great improvement, and has given good satisfaction. With care the building is capable of quite close regulation, and the daily temperature of the test room may be controlled within a small range. Tests can now be carried on at a practically uniform temperature very close to 62° Fahrenheit except during the extreme summer weather. We hope later to be able to install the automatic control, when still better results are expected. The cost of the electric heating has proved to be not any greater than that by gas. Between tests in the warm weather the ventilators and air intakes are closed during the day, and opened at night, when a current of cool air is forced through the building by means of blower fans. The extremely well insulated walls and ceiling usually prevent any excessive rise in temperature during the daytime.

The apparatus installed in the Comparator building, for the testing of measures of length, will be fully described elsewhere. In addition to the regular tests, some important experimental work has been done. The object of this was to investigate the characteristics of the apparatus, and the degree of precision which might be expected from it. That part of the work referring to the comparator base is not yet complete, but some interesting results have already been attained on the secondary apparatus. These go to show that this is capable of giving results beyond our best hopes and of a degree of accuracy far greater than that needed for most practical purposes.

In comparing tapes directly with the bench-marks, many precautions are entailed, and it was decided therefore that a secondary apparatus should be constructed so that surveying tapes might be quickly and accurately compared with the laboratory standards, which in turn are periodically referred to the bench-marks. Briefly, this apparatus consists of a series of pulleys, mounted in pairs, so that the two tapes are supported independently. At the ends are grooved pulleys supporting the wires imparting tension to the tapes, the tension being applied by means of weights. Micrometer microscopes at the two ends of the tape are used in making comparisons. The zeros of the tape and standard are brought into coincidence under one microscope, and readings are taken with the other. The supporting pulleys are spaced one hundred inches apart. With this spacing, the effect of differential sag may be neglected when the weights of the tapes agree within certain ordinary amounts. But the increased

friction due to the introduction of a large number of pulleys may prove to be a source of error sufficient to more than offset any erors that may arise from an erroneous correction for differential sag. If the apparatus is to be efficient, the friction must be reduced to a minimum. This point was kept in view during the design and construction of the apparatus. How successful was the result may be gauged from the tests which follow and also from the fact that it was found necessary to apply the tension weights at but one end, otherwise the tapes would not maintain their relative position for the short space of time required to take readings. As in use at present, the zero end of the standard is attached to a fixed point and that of the tapes to a slider having a fine longitudinal screw adjustment. The pulleys are of the lightest possible design consistent with the necessary strength and were carefully machined. They are mounted on ball bearings, also accurately made and adjusted.

The object of the experiments described below was to find out the amount by which the friction in the apparatus would affect the results obtained in the standardization of tapes.

The first test consisted in finding the force necessary to overcome friction in the apparatus. This was first done with the tape hanging in a single catenary, so that only the two grooved tension pulleys were involved, and then a similar test was made with the addition that the tape was supported along the intermediate pulleys. A sixty-six-foot steel tape was used in these tests, which were carried out with both a wire and a cord passed over the tension pulley. The pulleys were set in four positions 90° apart, and weights were added at one end until the tape began to move. The experiment was then repeated with every condition the same save that weights were added at the other end.

The following shows the results:—

Friction Test.—To determine the amount of friction in secondary apparatus. Tape: Steel tape, sixty-six feet under tension of ten pounds. (Cord connection.)

Average weight added for four positions of pulleys:—

End Pulleys only—

Weight added at pulley A. . . . . 0·019 pounds.
" " " C. . . . . 0·011 "
Mean for two ends. . . . . 0·015 "

Friction for one pulley only=0·008 pounds.

End Pulleys and nine intermediate pulleys—

Weight added at pulley A. . . . . 0·023 pounds.
" " " C. . . . . 0·016 "
Mean for two ends. . . . . 0·020 "

(Friction for two end pulleys and nine intermediate pulleys.)

Alteration in tension due to one end pulley, and nine intermediate pulleys, 0·012 pounds. (Working conditions.)

These results were obtained on the inner set of pulleys, used to support the standard. A similar determination for the outer set gave a value of 0·015 pounds for one end and nine intermediate pulleys. Using wire connections instead of cord for the tension weights, values of 0·014 pounds were obtained for each set.

This amount is seen to be very small. The correction to be applied from this source of error in testing a sixty-six-foot tape under the above conditions would amount to but approximately 1 in 10,000,000.

The test, though satisfactory from this point of view, gives no direct indication of the effect of friction on the determination of the length of a tape, and therefore a second series of experiments was made in order to detect, if possible, the exact amount by which readings are affected by friction in the apparatus. The tape and

standard were suspended on intermediate pulleys exactly as when making a regular test, and readings were taken first by bringing the zeros into coincidence from left to right and then in the opposite direction. When moved towards the zero by means of the adjusting screw, the tension at the zero end will be the sum of the weight and the friction in the pulleys; if the tape is moved in the other direction the tension at the zero end will be the difference of these. This difference in tension, if large enough to affect the readings, would cause the tape to show longer when moved towards the zero end than when moved in the opposite direction.

Tests were made on a sixty-six-foot tape, under tensions of ten pounds and ten kgs., and with a 100-foot tape under similar tensions. The two observers each made five settings and then changed places, so that, as far as possible, personal equations were eliminated. Three complete determinations were made under each of the above conditions; a typical example is recorded as follows:—

Friction Test.—To determine influence of friction on comparisons made with Secondary Apparatus:—

Steel tape, 100′ T S 863. Compared with T S 805 (laboratory standard tape.)

Tension=ten pounds.

Settings toward Zero—Microscope readings.		Settings from Zero—Microscope readings.	
Standard.	Tape.	Standard.	Tape.
(Obs.—W. G. H.)		(Obs.—W. G. H.)	
7·797mm	8·529mm	7·785mm	8·503mm
·795	·527	·785	·511
·796	·531	·784	·511
·794	·533	·785	·512
·797	·535	·788	·512
(Obs.—W. J. L.)		(Obs.—W. J. L.)	
7·805	8·522	7·805	8·520
·806	·529	·803	·525
·801	·525	·803	·529
·808	·530	·802	·528
·810	·529	·805	·526
Average value, tape longer than standard by 0·728mm.		Average value, tape longer than standard by 0·724mm.	

Tape apparently ·004mm longer when brought towards zero.

The following is a summary of all the tests:—

Friction Test.—To determine influence of friction on readings obtained with Secondary Apparatus:—

Conditions.	Variation of tape from standard.		Difference.
	To zero.	From zero.	
	mm	mm	mm
66′ steel tape. Tension=10 lbs.....	0·145	0·138	0·007
	0·148	0·140	0·008
	0·170	0·168	0·002
66′ steel tape. Tension=10 kgs.....	3·125	3·115	0·010
	3·120	3·114	0·006
	3·122	3·112	0·010
100′ steel tape. Tension=10 lbs.....	0·728	0·724	0·004
	0·729	0·727	0·002
	0·731	0·726	0·005
100′ steel tape. Tension=10 kgs.....	0·096	0·080	0·016
	0·099	0·085	0·014
	0·101	0·092	0·009

Although it appears possible to detect the effect of friction in the above, yet this is very small. In the example completely recorded, which shows the usual variation in a set of individual readings, the tape is apparently longer by ·004^{mm} when brought towards the zero. This is double the friction error and would cause an apparent error in the length of the tape of about 1 in 15,000,000. The various other tests give a maximum error of approximately 1 in 4,000,000.

The results tend to show that the friction is extremely small, and the slight influence on readings is within the degree of accuracy which is desired for any comparison on the secondary apparatus.

Correspondence.

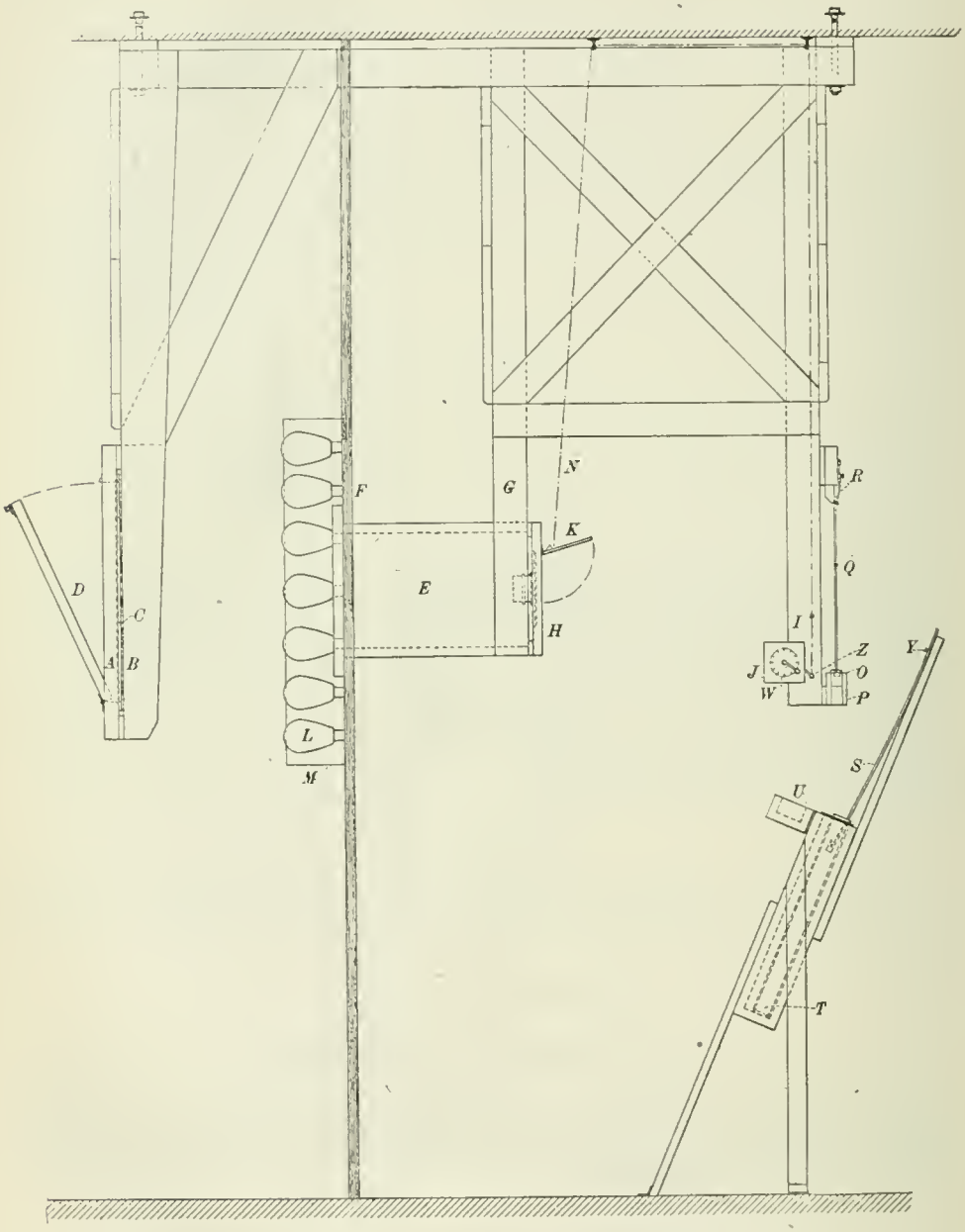
The number of draft letters prepared was 1,612. Sixty-four letters of instruction to surveyors were prepared, and 454 memoranda written.

PHOTOLITHOGRAPHIC OFFICE.

(H. K. Carruthers, Process Photographer.)

The work of this office has increased so much that it was necessary to install a second copying camera, and as the townships, which are of a standard size and reduction, comprise most of the work, it was decided to make it a fixed focus camera to take care of this particular work.

A space in one corner of the room seven feet by thirteen feet was partitioned off and the camera hung partly in and partly out of this room.



This cut shows a vertical section of the apparatus, and is as follows:—

On the ceiling is bolted a heavy pine frame from which project the arms B, G, and I.

On the arms B, which are outside the partition F, is fastened the copyholder A. This holder has a plate glass C fastened to the inside face, and against this glass the copy is held by the pressure from the hinged panel D.

The lens box E is screwed to the partition F, and on both sides of this box-opening is arranged fourteen 110-volt 200-watt high efficiency Tungsten lamps L with two reflecting mirrors M.

The arms G carry the lens board H and, to avoid vibration, hang free of the lens box.

As the exposure is made in the dark-room, a plate holder is unnecessary.

A glass plate is coated with collodion and placed on the ebonite dipper S, then lowered into the silver bath T. The hinged lid U is turned over into place to exclude light and dust.

After sensitizing is completed, which requires about four minutes' immersion, the plate is drawn up and the dipper S hung on hook Y to permit of the excess silver draining back into the bath. Before raising the plate the room is darkened, sufficient light coming through a large ruby glass window.

The plate is now taken off the dipper and placed in position for exposure.

On the arms I are wooden blocks P which are cut out to receive the ebonite plate-rest O. On this plate-rest the sensitized plate Q is laid and held firmly in position by the sliding catch R.

Directly behind the plate within arms' reach is the switch which controls the lamps L.

The exposure is timed by a Warwick meter J. The hand W being set, all that remains is to pull down the lever Z. This pulls the cord N and raises the lens cap K. When the hand W travels back to zero the lever Z is automatically released, closing the lens cap K.

The regular proceedure is followed in developing and fixing the plate.

The developing trays and sink, being about three feet from the camera, considerable walking is saved, and the negatives are made more expeditiously.

A new marble switchboard with ammeter and rheostats was installed, adding materially to the safety and convenience of the numerous arc and other lamps, mercury tubes, etc., used in the office.

Hill work on the three-mile sectional maps which is in black on the old manuscripts, is now printed in brown. To avoid redrawing the sheets, the hills are stopped out on the negative by the retouchers.

The hill work is drawn separately on tracing linen by the draughting division in exact register with the black.

During the year a retoucher was added to the staff, bringing the total number up to eight, of whom one is absent on active military duty. A schedule of the work for the year is given in Appendix No. 6.

PHOTOGRAPHIC OFFICE.

(J. Woodruff, Chief Photographer.)

The output of the photographic office shows a decrease as compared with last year. This is principally in the smaller sizes of velox prints and negatives, large numbers of which were formerly printed and devoloped for other branches of the service. This work had to be discontinued owing to the increasing size of and the longer time demanded by our own work, so that although the number of items is less than last year, the amount of work done is really greater.

In Vandyke and blue-print work only such sizes as can be conveniently handled in the limited space at our disposal are now done here, the very large tracings being sent to the Railway Lands Branch, where special equipment is available for doing such work.

On the fixed focus enlarging camera, nearly 2,000 enlargements were made. This camera is used only for enlarging from topographical survey negatives. These are enlarged to a standard size of ten by fourteen inches on bromide paper, and the prints are used in plotting the survey.

This camera, which has been in use for many years, has been entirely remodelled in preparation for next season's work. The method of illuminating the negative has been changed. Four powerful nitrogen-filled Tungsten lamps are now used, and this together with a new lens has much improved the definition of the enlarged image. A new negative holder has also been added, which is unique in construction and a big improvement on the old one.

The changes will facilitate the working of the camera as well as improve the quality of the work.

The new enlarging camera which was installed last year, and of which a description was given in the report, has proved most satisfactory and is a great help in getting out the work of the office promptly.

The staff remains the same as last year, viz., one photographer and four assistants. A schedule of the year's work accompanies this report.

LITHOGRAPHIC OFFICE.

(A. Moody, Foreman).

Appendix No. 8 shows an increase of output over last year, the monthly average of plans printed being over 111, and the number of copies over 35,000. Many of these plans were printed in several colours, making the number of runs on the two power presses about 70,000. This is by no means a large run for two presses, but as the number of copies from each map or plan is small a considerable amount of time is spent in changing from one plate to another and again from one colour to another.

In addition to the regular work of this office, maps and plans have been printed for several other branches of the department, including maps of forest reserves for the Forestry Branch, plans to accompany Orders in Council for the Ordnance Lands Branch, and maps for the International Waterways Commission.

The printing of sectional maps on the three-mile scale in colours is being gradually carried out. For a time they were printed in black with a tint of blue for water areas. The next step was to print hills in brown and still later a green was added for forest reserves. These colours add greatly to the appearance and to the clearness of the maps, as well as to the work of the printers, the plates for all flat tints having to be made by them. The same is true also of the reprinting of plans of townships formerly issued in colours; here again all the colours, *i.e.*, all the work except the black is done by the printers.

Owing to increase of work generally an additional transferrer was engaged.

GEOGRAPHIC NOMENCLATURE.

Mr. Whitcher, who has charge of this branch of work in the department, reports the usual examination of all the sketch maps, compiled township plans, sectional, and other maps, surveyors' reports, etc., and has also continued to act as a member and secretary of the Geographic Board of Canada. The annual report of the board, which is still published as a supplement to the annual report of this department, is now closed at the expiration of the fiscal year, instead of the former date, June 30, and includes all decisions rendered during the year, which had been previously published in *The Canada Gazette* and in bulletin form. The report was printed in English and French and largely distributed to Dominion and provincial officials, geographical societies, colleges and schools.

BOARD OF EXAMINERS FOR DOMINION LAND SURVEYORS.

(J. Aurele Cote, Secretary.)

The Board of Examiners for Dominion Land Surveyors held three meetings during the year. The first was a special meeting lasting from April 28 to June 4 (inclusive), 1914, during which examinations were held at Ottawa, Toronto, Winnipeg, Regina, Calgary, and Edmonton. The second was another special meeting which took place on September 23, 1914. The third was the regular annual meeting called for by section 9 of the Dominion Lands Surveys Act. It began on Monday, February 8, 1915, and lasted until March 26, 1915. During this meeting examinations were held at Ottawa, Kingston, Montreal, Toronto, Winnipeg, Calgary, Edmonton, and Dawson. The total number of candidiates for examination was 280. Of these, 201 tried the preliminary examination, seventy-three tried the final examination, and six tried the examination for Dominion Topographical Surveyor.

Twenty-eight candidates were successful at the preliminary examination as follows:—

Preliminary Examination.

Alberga, George Frederick, Montreal, Que.
Bradley, Nicholas Hilburn, Calgary, Alta.
Brown, Leo. B., Holden, Alta.
Burchnall, Ralph Parker, Calgary, Alta.
Burn, George Augustus Harold, Janetville, Ont.
Bysshe, Gordon Thomas, Ottawa, Ont.
Cormack, Alexander, Edmonton, Alta.
Cox, Arthur George, Ottawa, Ont.
Caughlan, John Q., Chipman, Alta.
Crain, G. E., Ottawa, Ont.
Duncan, Stuart MacPherson, Ottawa, Ont.
Fraser, Andrew Stockwell, Ottawa, Ont.
Greig, Joseph W., Kingston, Ont.
Hemmerich, George, Conestogo, Ont.
Hogarty, Bertrand B., Winnipeg Man.
Jones, J. Donovan, Amherst, N.S.
McKittrick, Ernest S., Edmonton, Alta.
Meikle, MacKay, Ottawa, Ont.
Murphy, Charles Homan, Edmonton, Alta.
Nesbitt, Francis Grey, Sherbrooke, Que.
O'Brien, J. Edwin, Toronto, Ont.
Orr, William S., Cobourg, Ont.
Pringle, John Earle, Hamilton Ont.
Racknow, Ernest, Princeton, Ont.
Scott, Russell George, Toronto, Ont.
Somerville, William Johnston, Ottawa, Ont.
Throop, Wilfred Earle, Brockville, Ont.
Walcot, John Bevan, Montreal, Que.

Forty-two candidates were successful at the final examination as follows:—

Final Examination.

Alexander, John Bentley, Vancouver, B.C.
Beatty, Frank Weldon, Pembroke, Ont.
Beatty, William Benjamin, Sarnia, Ont.
Benner, James King, Alvinston, Ont.
Beresford, Herbert Graham, Winnipeg, Man.
Browne, Ernest Frank, Ottawa, Ont.
Brown, Lindsay Osborne, Ottawa, Ont.
Brown, Milton, Kitscoty, Alta.
Carson, John Alton, Vancouver, B.C.
Child, Cyril George, Calgary, Alta.
Coltham, James Thomas, Aurora, Ont.
Crowther, Keston Nelson, Qu'Appelle, Sask.
Crouch, Milton Edwin, Toronto, Ont.
Doze, Joseph Wilbert, Fort Saskatchewan, Alta.
Draper, Walter Harold, Edmonton, Alta.
Duffield, Hugh J., Calgary, Alta.
Ewing, Ernest Olliphant, Toronto, Ont.
Finnie, Oswald Sterling, Ottawa, Ont.
Gass, Lawrence Henderson, Iroquois, Ont.
Gibson Morton Milne, Willowdale, Ont.
Gorman, Arthur Oswald, Buckingham, Que.
Gourley, Robert Murray, North Bay, Ont.
Hardonin, Joseph, Calgary, Alta.
Harper, Clarence Johnston, Orangeville, Ont.
Hellferth, John Benedictus, Toronto, Ont.
Hotchkiss, Cyrus Percival, Edmonton, Alta.
Kinnear, Louis Arthur, Port Colborne, Ont.
Leitch, John Strickland, Calgary, Alta.
Lumb, William Ewart, Fort Stewart, Ont.
MacLeod, David Douglas, Park Hill, Ont.
McCloskey, Michael D'Arcy, Chelsea, Que.
McKusker, Knox Freeman, St. Louis de Gonzaque, Que.
Meikle, Angus Urquhart, Kingston, Ont.
Melrose, Thomas Montague, Coaticook, Que.
Moran, Patrick Joseph, Kingston, Ont.
Perron, Hermel Marie, Edmonton, Alta.
Robinson, William Earl, Columbus, Ont.
Scott, Buckton Arthur, Essex, England.
Shaver, Peter Albert, Calgary Alta.
Smith, Neville Herbert, Ottawa, Ont.
Venney, Leonard Thomas, Brockville, Ont.
Zinkan, William Edward, Southampton, Ont.

The time of the board, during the meetings, was largely taken up with the reading and valuation of the candidates' answer-papers. Complete sets of question papers,

to be used at the next examination were also prepared. In addition to this, the evidence submitted by candidates at the final examination, in proof of their eligibility therefor, had to be examined. This evidence consisted of certificates of provincial land surveyors and of affidavits of service under articles or apprenticeship.

Four candidates, who presented themselves for final examination, had not quite completed their time under articles. They were admitted on the understanding that, in case they were successful, their commissions would not issue until they had completed their apprenticeship and furnished affidavits in the regular form.

The board had to consider several applications which were received from college and university graduates asking to be admitted to the privileges of section 22 of the Surveys Act which provides for a shorter term of service under articles.

The Board of Examiners, wishing to facilitate in every way the enlistment for active service of articled pupils, gave the following decision at one of its meetings: "That in all cases where a candidate is articled to a Dominion land surveyor, time spent on active military duty would count as office time under articles to a Dominion land surveyor, but not as field time."

During the year a new edition of the "Rules and Regulations of the Board" was published. This edition is known as the "Ninth Edition," and contains several amendments to the former publication. Previously, marks were allotted to the various subjects in the order of importance, while now one hundred marks are allotted to each subject. This arrangement facilitates greatly the marking of the papers.

Forty-one commissions were issued to candidates who had passed the final examination, and had furnished oaths of office and allegiance and bonds for the sum of one thousand dollars, as required by section 25 of the Dominion Lands Surveys Act.

Thirty-one certificates of preliminary examination were issued to successful candidates who had complied with the requirements of the law.

Section 35 of the Dominion Lands Surveys Act provides that every Dominion land surveyor shall be in possession of a subsidiary standard of length. Fifteen new standards were issued to surveyors during the year. A list of Dominion land surveyors who are in possession of standard measures will be found in Appendix No. 9. A communication was received from the secretary of the Ontario Land Surveyors' Association pointing out that the O.L.S. standard measure was in every way similar to the D.L.S. standard, and asking that any Ontario land surveyor who becomes a Dominion land surveyor should not be required to procure a new standard. He was informed that there was no objection to his request, provided the standard was in good condition and was tested under the supervision of the Surveyor General at Ottawa.

Mr. F. D. Henderson, who had been secretary of the board since 1906, resigned his office during the year, and Mr. J. Aurele Cote, of the Topographical Surveys Branch, Interior Department, was appointed to the position in July, 1914.

The correspondence of the board was as follows: Letters received, 1,621; letters sent, 914; circular letters, pamphlets and parcels sent, 1,547.

APPENDICES.

No. 1. Schedule of surveyors employed and work executed by them.

No. 2. Schedule showing for each surveyor employed the number of miles surveyed, of township section line, township outline, traverses of lakes and rivers, and resurvey; also the cost of the same.

No. 3. Surveys in the Yukon territory returns of which have been received during the year.

No. 4. Details of the office work.

No. 5. Sectional maps of which new editions have been issued.

No. 6. Work executed in the photographic office.

No. 7. Work executed in the lithographic office.

No. 8. Office staff of the Topographical Surveys Branch at Ottawa, as on April 1, 1915, with the name, classification, duties of office, and salary of each.

No. 9. List of Dominion Land Surveyors who are in possession of standard measures.

Nos. 10 to 61. Abstracts of reports of surveyors employed.

No. 62. Results of magnetic observations.

No. 63. Results of watch trials.

No. 64. List of surveying instruments on hand on March 31, 1915.

MAPS AND PROFILES.

The following maps and profiles accompany this report:—

Map showing surveys to March 31, 1915.

Maps to accompany reports of surveyors.

Profiles of meridians and base lines.

I have the honour to be, sir,

Your obedient servant,

E. DEVILLE,

Surveyor General.

TOPOGRAPHICAL SURVEYS BRANCH

SCHEDULES AND STATEMENTS

APPENDIX No. 1.

SCHEDULE of Surveyors employed and work executed by them from April 1, 1914, to March 31, 1915.

Surveyor.	Address.	Description of Work.
Akins, J. R.	Ottawa, Ont.	Survey of the 29th base line across ranges 2 to 24, west of the Fifth meridian.
Aylsworth, C. F.	Madoc, Ont.	Resurvey in tp. 22-3-Pr., tp. 23-5-Pr., tp. 12-10-E., and tp. 14-11-E. Traverse in tp. 20-4-Pr.
Baker, M. H.	Toronto, Ont.	Subdivision in tps. 12 and 16-1-4, tps. 14 and 15-5-4, tp. 17-6-4, tp. 21-8-4, tp. 20-9-4, and tp. 19-7-5. Retracement in tps. 14 and 15-5-4, tp. 20-9-4, tp. 5-14-4, and tp. 16-4-5. Resurvey in tp. 13-24-3, and tp. 9-12-4. Correction survey in tp. 23-29-3, and tp. 41-14-4. Traverse in tps. 1 and 20-4-4. Survey of lot in secs. 7 and 8, tp. 28-18-5. Restoration survey of the cemetery at Field. Traverse of roads from Field to Hector, from Field to Ottertail, from Field out the Yoho valley, and from Lake Louise station to Chateau Lake Louise. Posting of part of the townsite of Wymark. Retracement of coal claims along Sheep river in tp. 19-4-5. Survey of Moraine road in tps. 27 and 28-6-5.
Bélanger, P. R. A.	Ottawa, Ont.	Inspection of contracts Nos. 4, 6 and 19 of 1913, and Nos. 5, 6, 7, 8, 10, 11, 12 and 15 of 1914. Subdivision surveys in tp. 80-11-5 and tp. 80-12-5.
Bennett, G. A.	Tillsonburg, Ont.	Stadia surveys in tp. 36-14-3, tps. 35 and 36-15-3, tps. 35 and 36-16-3, tp. 35-17-3, tps. 31, 34 and 35-19-3, tps. 32 and 33-20-3, tps. 32, 34 and 36-21-3, tps. 31, 32, 33, 34, 35 and 36-22-3, tp. 34-23-3, tps. 27, 28, 29 and 30-24-3, tps. 27, 28, 29 and 30-25-3, tps. 27, 28, 29 and 30-26-3, tps. 27, 28, 29 and 30-27-3, tps. 26, 27, 28, 29 and 30-28-3, tps. 27, 28, 29 and 30-29-3, tps. 27 and 29-1-4, and tp. 28-3-4. Retracement surveys in tp. 32-14-4, tps. 31 and 32-15-4, tp. 34-16-4, tps. 34 and 37-17-4, tps. 35 and 36-18-4, tp. 35-27-4, tps. 34 and 35-28-4, and tp. 34-29-4. Correction surveys in tp. 38-18-4, tp. 38-19-4, tp. 37-25-4, and tps. 41 and 42-28-4. Traverse in tp. 55-24-4.
Blanchet, G. H.	Ottawa, Ont.	Survey of the 24th base line across ranges 12 to 25, and the 25th base line across ranges 13 to 25, west of the Fourth meridian. Retracement of the 24th base line across part of range 11, and the 25th base line across part of range 12, west of the Fourth meridian.
Boivin, E.	Chicoutimi, Que.	Contract No. 16 of 1914. Subdivision of tps. 78, 79, 80, 81 and 82-17-4, and the north third of tp. 77-17-4.

SCHEDULE of Surveyors employed and work executed by them from April 1, 1914, to March 31, 1915—*Continued.*

Surveyor.	Address.	Description of Work.
Boulton, W. J.	Wallaceburg, Ont.	Stadia surveys in tps. 7, 8, 9 and 10-15-4, tps. 7, 8, 9, 10, 11 and 12-16-4, tps. 7, 8, 9, 10, 11 and 12-17-4, tps. 7, 8, 9, 10 and 11-18-4, tps. 7, 8, 9 and 10-19-4, and tps. 8 and 9-20-4.
Bowman, E. P.	West Montrose, Ont.	Stadia surveys in tps. 7, 8, 9 and 10-15-4, tps. tps. 37, 38, 39, 40 and 41-14-3, tps. 37, 38, 39, 40 and 41-15-3, tps 36, 37, 38, 39 and 40-16-3, tps. 36, 37, 38, 39, 40 and 41-17-3, tps. 37, 38, 39, 40 and 41-18-3, tps. 51 and 52-21-3, tps. 51, 52 and 53-22-3, tps. 52 and 53-23-3, tps. 52 and 53-24-3, and tp. 52-25-3.
Brenot, L.	Ottawa, Ont.	Survey of the east outlines of tps. 81, 83 and 84-24-6, and tps. 80, 83, and 84-25-6. Subdivision in tp. 83-17-6, tps. 82 and 83-18-6, and tps. 79, 80 and 82-24-6. Traverse in tp. 83-21-6, and tp. 81-25-6. Resurvey of Hudson's Bay Company's posts at Fort St. John and Hudson Hope.
Bridgland, M. P.	Calgary, Alta.	Photo-topographical survey of the southern part of the Crowsnest Forest Reserve. Retracement of the triangulation of the Rocky and Selkirk mountains.
Brownlee, J. H.	Vancouver, B.C.	Survey of road from sec. 32, tp. 17, E.C.M., to sec. 19, tp. 18, E.C.M.
Buchanan, J. A.	Edmonton, Alta.	Contract No. 13 of 1914. Subdivision of tps. 85, 86 and 87-21-5, and tps. 85, 86, 87 and 88-22-5.
Calder, J. A.	Lytton, B.C.	Subdivision in tps. 22 and 23-20-6, tp. 22-21-6, tps. 17, 18, 19 and 20-24-6, tps. 17 and 18-25-6, tps. 15, 16 and 17-26-6, and tp. 17-27-6. Traverse in tp. 23-20-6, tp. 22-21-6, tps. 18 and 19-24-6, tps. 17 and 18-25-6, and tps. 15 and 17-26-6.
Christie, W.	Prince Albert, Sask.	Subdivision of tp. 71-20-4, tps. 70 and 71-21-4, and tps. 70 and 71-22-4; part subdivision of tp. 70-20-4, and tp. 72-22-4. Survey of east outline of tp. 72-21-4.
Coltham, G. W.	Aurora, Ont.	Stadia surveys in tps. 43, 45, 46 and 47-8-4, tps. 42, 43, 44, 45, 46 and 47-9-4, tps. 42, 43, 44, 45, 46, 47 and 48-10-4, tps. 42, 43, 44, 45, 46, 47 and 48-11-4, tps. 43, 44, 45, 46, 47 and 48-12-4, tps. 43, 44, 45 and 46-13-4, and tps. 43, 44, 45, 46 and 47-14-4.
Coté, J. M.	Ottawa, Ont.	Subdivision in tp. 4-7-4, tps. 3 and 4-8-4, and tp. 3-9-4. Resurvey in tp. 51-23-3, tp. 51-24-3, tp. 22-10-4, tp. 21-11-4, tps. 21 and 22-12-4, and tp. 54-19-4. Correction survey in tp. 38-28-4, and 38-1-5. Retracement survey in tp. 20-1-4, and tp. 20-2-4.
Cowper, G. C.	Welland, Ont.	Stadia surveys in tps. 11, 12, 13 and 14-8-3, tps. 11, 12, 13 and 14-9-3, tps. 11, 12, 13 and 14-10-3, tps. 11, 12, 13, 14 and 15-11-3, tps. 11, 12, 13 and 14-12-3, tps. 11, 12, 13, 14, 15 and 16-13-3, tps. 11, 12, 13, 14, 15 and 16-14-3, tps. 11, 12, 13 and 14-15-3, tps. 10, 11 and 14-16-3, tps. 11, 12 and 13-17-3, tps. 9, 11, 12, 13, 14, 19 and 22-18-3, tps. 11, 12, 13, 14, 22 and 23-19-3, tps. 7, 8, 9, 10, 11, 12, 13 and 23-20-3, tp. 11-21-3, tp. 11-22-3, tp. 11-23-3, tp. 11-24-3, tps. 11, 12 and 17-25-3, tps. 11, 12 and 17-26-3, tps. 11, 12, 13, 14, 15, 16 and 17-27-3, tps. 11, 12, 13, 14, 15, 16 and 17-28-3, tps. 11, 12, 13, 14, 15, 16, 17 and 18-29-3, tps. 11, 12, 13, 14, 15, 16 and 17-30-3, and tps. 13 and 14-1-4.

SESSIONAL PAPER No. 25

SCHEDULE of Surveyors employed and work executed by them from April 1, 1914, to March 31, 1915—*Continued.*

Surveyor.	Address.	Description of Work.
Cumming, A. L.	Cornwall, Ont.	Subdivision of tp. 82-21-5 and tp. 82-22-5. Partial subdivision of tp 84-20-5, tp. 83-21-5, tp. 83-22-5, and tp. 82-23-5. Traverse in tp. 70-27-4, tp. 72-2-5, tp. 72-3-5, tps. 72 and 73-9-5, and tp. 73-10-5. Retracement in tp. 73-6-5, tp. 84-21-5, tp. 84-22-5, and of lot 21, group 1, in tp. 72-2-5. Resurvey of road through lots 1 and 2 of Athabaska settlement.
Davies, T. A.	Edmonton, Alta.	Contract No. 10 of 1914. Subdivision of tp. 81-21-5, tp. 81-22-5, tp. 81-23-5, tps. 78, 79 and 80-24-5, and the west half of tp. 81-20-5.
Day, H. S.	Edmonton, Alta.	Contract No. 17 of 1914. Subdivision of tp. 83-16-4, and tps. 83, 84, 85 and 86-17-4. Survey of the east outlines of tps. 81, 82 and 84-16-4, tps 81 and 82-17-4, and tps. 81 and 82-18-4.
Deans, W. J.	Brandon, Man.	Inspection of contracts Nos. 13 and 26 of 1912, Nos. 21, 24, 25, 26, 27 and 28 of 1913, and Nos. 20 and 21 of 1914. Partial inspection of contract No. 13 of 1911. Subdivision of summer resort at Madge Lake in tp. 30-30-Pr., of lots in tp. 15-5-Pr., and in tps. 32 and 33-13-Pr. Survey of part of Grand Rapids settlement. Inspection of work done by R. J. Jephson in 1912.
Evans, S. L.	Corinth, Ont.	Subdivision survey in tp. 24-8-3 and tp. 24-9-3. Resurvey in tp. 39-13-3, tp. 16-21-3, and tp. 23-23-3. Retracement survey in tps. 24 and 26-8-3. tps. 24, 25 and 26-9-3, and tp. 26-10-3. Subdivision of lots at Clear Lake in tp. 19-19-Pr. Topographical survey of site for summer resort at Madge Lake in tp 30-30-Pr.
Fawcett, S. D.	Ottawa, Ont.	Settlement surveys at Pelican, Hay River and Fort Providence. Surveys of additions to settlements at Fort Resolution and Fort Simpson.
Fletcher, J. A.	Ottawa, Ont.	Survey of the 26th base across ranges 1 to 17, west of the Fifth meridian, and of the 27th base across ranges 1 to 9, west of the Fifth meridian.
Fletcher, W. A.	Thornton, Ont.	Stadia surveys in tp. 26-10-2, tps. 25, 26 and 27-11-2, tps. 25, 26 and 27-12-2, tps. 24, 25, 26, 27, 27a and 28-13-2, tp. 27a-13a-2, tps. 25, 26, 27 and 27a-14-2, and tp. 27a-15-2.
Fontaine, L. E.	Lévis, Que.	Inspection of contracts Nos. 2, 9, 13, 14, 16, 17, 18 and 19 of 1914. Subdivision in tp. 77-24-5. Retracement survey in tps. 70 and 78-5-6, tps. 72 and 78-6-6, tp. 71-7-6, and tp. 72-8-6. Traverse in tp. 77-24-5, tps. 71 and 72-7-6, tp. 72-8-6, tp. 71-10-6, and tp. 70-11-6.
Francis, John.	Portage la Prairie, Man.	Contract No. 20 of 1914. Subdivision of tps. 34 and 35-8-Pr., and tps. 34, 35 and 36-9-Pr.
Galletly, J. S.	Oshawa, Ont.	Subdivision in tp. 64-14-Pr., tps. 63 and 64-15-Pr., tps. 63 and 64-16-Pr., tp. 62-18-Pr., tps. 61 and 62-19-Pr., tp. 61-24-Pr., and tp. 56-27-Pr. Survey of east outlines of tp. 64-17-Pr., and tps. 61, 63 and 64-18-Pr. Traverse in tp. 63-18-Pr., tp. 56-26-Pr., and tp. 56-27-Pr. Survey of lot in tp. 65-26-Pr. Mounding in tps. 57 and 58-26-Pr.
Gibbon, Jas.	Vancouver, B.C.	Subdivision in tp. 7-23-6, tps. 6 and 7-24-6, and tps. 5 and 6-25-6. Traverse in tp. 7-23-6, tps. 6 and 7-24-6, and tps. 5 and 6-25-6.
Glover, A. E.	Beaverton, Ont.	Contract No. 5 of 1914. Subdivision of tps. 71, 72 and 73-25-5, and tps. 70, 71, 72 and 73-26-5. Survey of the east outline of tp. 69-27-5.
Green, T. D.	Ottawa, Ont.	Subdivision of tp. 36-8-5, tp. 40-10-5, and part of tp. 35-8-5.

SCHEDULE of Surveyors employed and work executed by them from April 1, 1914, to March 31, 1915—*Continued.*

Surveyor.	Address.	Description of Work.
Griffin, A. D.	Elk Lake, Ont.	Contract No. 19 of 1914. Subdivision of tp. 91-9-4, tps. 92 and 93-10-4, tp. 88-11-4, tp. 88-12-4, and parts of tp. 90-9-4 and tp. 91-10-4. Survey of the east outline of tp. 92-9-4.
Hawkins, A. H.	Listowel, Ont.	Survey of the Principal meridian from the 21st to the 23rd base line and the 22nd base line across range 1, west of the Principal meridian, and range 1, east of the Principal meridian. Retracement of the Second meridian from the NE corner tp. 56-1-2 to NE. corner sec. 12, tp. 85-1-2, and of the 15th base line across ranges 1 to 21, west of the Second meridian.
Heathcott, R. V.	Edmonton, Alta.	Contract No. 12 of 1914. Subdvision of tps. 78 and 79-14-5, tps. 78 and 79-15-5, tps. 78 and 79-16-5, the north third of tp. 77-14-5, and the north two-thirds of tp. 77-15-5. Survey of the east outlines of tps. 80-14-5, tp. 80-15-5, and tp. 80-16-5.
Herriot, G. H.	Ottawa, Ont.	Survey of the 19th base line across ranges 1 to 5, the 21st base line across ranges 12 to 20, and the 22nd base line across ranges 21 and 22, east of the Principal meridian. Survey of the Second meridian east, from the 22nd to the 23rd base line, the 23rd base line across ranges 1 to 11, and the 24th base line across range 11, east of the Second meridian east. Survey of the east outline of tps. 81, 82, 83 and 84-20-E., and tps. 89, 90, 91 and 92-11, E. 2 E.
Holcroft, H. S.	Toronto, Ont.	Subdivision of lots at Fort Churchill. Retracement of Hudson's Bay Company's reserve and Royal Northwest Mounted Police reserve at Fort Churchill.
Jackson, J. E.	Hamilton, Ont.	Contract No. 21 of 1914. Subdivision of tps. 27 and 28-3-E., tps. 25, 26 and 27-5-E., and tps. 26 and 27-6-E.
Johnston, J. H.	Edmonton, Alta.	Contract No. 14 of 1914. Subdivision of tps. 85, 86, 87, 88 and 89-20-5, and tps. 88 and 89-21-5.
Johnston, W. J.	St. Catharines, Ont.	Subdivision in tps. 22 and 23-1-6, tps. 22 and 23-2-6, tps. 19 and 20-5-6, tps. 18, 19, 22 and 23-6-6, tp. 22-7-6, tp. 21-12-6, and tp. 21-13-6. Traverse in tps. 22 and 23-1-6, tps. 22 and 23-2-6, tp. 19-5-6, tps. 18 and 19-6-6, tp. 23-10-6, tps. 20, 21 and 22-12-6, and tp. 21-13-6. Stadia surveys in tps. 20 and 21-29-5 and tp. 21-1-6.
LeBlanc, P. M. H.	Ottawa, Ont.	Subdivision of tp. 107-14-5, tp. 106-15-5, and tp. 108-17-5. Partial subdivision of tp. 108-5-5, tps. 108 and 109-11-5, tps. 108 and 109-12-5, tp. 109-13-5, tp. 104-14-5, tps. 107 and 108-15-5, tp. 108-16-5, and tp. 108-18-5. Survey of the east outlines of tps. 105 and 106-14-5, tp. 105-15-5, tp. 105-16-5.
Lonergan, G. J.	Buckingham, Que.	Inspection of work performed by daily-paid surveyors in Manitoba, Saskatchewan, Alberta, and British Columbia.
MacLeod, G. W.	Edmonton, Alta.	Contract No. 2 of 1914. Subdivision of tp. 75-10-6, tp. 69-11-6, tps. 69, 70, 71 and 72-12-6, tps. 78 and 79-16-6, and the north two-thirds of tp. 74-10-6. Survey of the east outlines of tps. 77 and 80-17-6.
Martyn, O. W.	Regina, Sask.	Survey of the townsite of Wymark, Sask., in tp. 13-13-3.

SCHEDULE of Surveyors employed and work executed by them from April 1, 1914, to March 31, 1915—*Continued.*

Surveyor.	Address.	Description of Work.
Matheson, H.	Ottawa, Ont.	Topographical survey near Jasper, in the valleys of Athabaska and Miette rivers. Survey of the corral near Jasper. Posting of a portion of the townsite of Jasper. Survey of coal lease in tp. 49-26-5.
Melhuish, P.	Vancouver, B.C.	Subdivision in tp. 3-28-6, tp. 4-29-6, tp. 3-30-6, tp. 5-4-7, tp. 24, E.C.M. and tp. 39, W.C.M. Traverse in tp. 3-28-6, tp. 4-29-6, tp. 3-30-6, tp. 5-4-7, tp. 24, E.C.M., and tp. 39, W.C.M. Survey of addition to the townsite of Woodhaven.
McKay, R. B.	Vancouver, B.C.	Latitude observations on the Fourth meridian, the Fifth meridian and the Sixth meridian, in northern Alberta.
McKnight, J. H.	Simcoe, Ont.	Stadia surveys in tp. 48-10-2, tps. 31, 32 and 33-12-2 tps. 32 and 33-13-2, tps. 35, 36 and 38-14-2, tps. 35, 36, 37 and 38-15-2, tps. 31, 36, 37 and 38-16-2, tps. 34, 35, 36, 37 and 38-17-2, tps.33, 35, 36, 37 and 38-18-2, and tps. 33, 34, 35, 36, 37 and 38-19-2.
McMaster, W. A. A.	Prince Albert, Sask.	Resurvey in tp. 46-25-2. Retracement in tp. 47-26-2, tps. 47 and 48-27-2, and tp. 47-28-2. Resurvey of part of Prince Albert settlement. Subdivision in tp. 51-1-3.
Narraway, A. M.	Ottawa, Ont.	Survey of the 6th base line across range 10 and part of range 11, the 12th base line across ranges 2 and 3, and the 13th base line across part of range 1, west of the Principal meridian, and ranges 1, 2 and part of range 3, east of the Principal meridian. Survey of the east outlines of tps. 45, 46, 47 and 48-1-E., and of tps. 38, 39, 40, 41, 42, 43 and 44-3-E.
Neelands, R.	Hamiota, Man.	Stadia surveys in tp. 44-21-2, tp. 44-22-2, tps. 38, 39, 40, 41 and 42-25-2, tps. 38, 39, 40, 41 and 42-26-2, tps. 38, 39, 40, 41, 42, 43, 44, 45 and 45a-28-2, tps. 41, 42, 42a, 43 and 44-1-3, and tps. 52 and 53-7-3.
Norrish, W. H. (This work was originally allotted to Mr. A. E. Hunter, but on his decease it was continued by Mr. Norrish.)	Guelph, Ont.	Subdivision in tps. 13, 14 and 15-23-6, tp. 16-24-6, and tps. 11, 12 and 13-26-6. Traverse in tps. 14 and 15-23-6, tp. 16-24-6, tps. 11, 12 and 13-26-6, and tp. 13-27-6.
Palmer, P. E.	Dorchester, N.B.	Subdivision in tps. 69 and 70-7-Pr., tps. 68 and 69-8-Pr., tps. 67 and 68-9-Pr., tps. 65, 66 and 67-10-Pr., tps. 65 and 66-11-Pr., tp. 65-12-Pr., and tps. 64 and 65-13-Pr. Survey of island in Saskatchewan river in tp. 56-26-Pr.
Pearson, H. E.	Edmonton, Alta.	Contract No. 15 of 1914. Subdivision of tps. 79, 80 and 81-25-4, tps. 79, 80 and 81-26-4, and tps. 79, 80 and 81-1-5. Survey of the east outlines of tps. 77 and 78-25-4, tps. 77 and 78-26-4, and tps. 77 and 78-2-5.
Pierce, J. W.	Ottawa, Ont.	Contract No. 18 of 1914. Subdivision of tp. 87-16-4, tp. 87-17-4, the north two-thirds of tp. 87-12-4, tp. 87-13-4, tp. 87-14-4, and tp. 87-15-4, and the south third of tp. 88-13-4, tp. 88-14-4, tp. 88-15-4, and tp. 88-16-4. Survey of the east outlines of tps. 85 and 86-16-4, tps. 85 and 86-17-4, and tp. 88-18-4.
Pinder, G. Z.	Edmonton, Alta.	Contract No. 11 of 1914. Subdivision of tp. 79-18-5, tp. 79-19-5, tps. 79 and 80-20-5, tps. 79 and 80-21-5, and part of tp. 80-19-5. Survey of the east outlines of tp. 78-19-5, and tp. 78-20-5.
Ponton, A. W.	Edmonton, Alta.	Contract No. 6 of 1914. Subdivision of tp. 73-21-5, tps. 73 and 74-22-5, tps. 73 and 74-23-5, tp. 73-24-5, and the south two-thirds of tp. 75-22-5, and tp. 75-23-5.

SCHEDULE of Surveyors employed and work executed by them from April 1, 1914, to March 31, 1915—*Continued.*

Surveyor.	Address.	Description of Work.
Purser, R. C.	Windsor, Ont.	Subdivision in tps. 29 and 30-13-3, tps. 23, 24 and 25-15-3, and tp. 24-16-3. Retracement in tps. 14 and 15-1-Pr., tps. 14 and 15-2-Pr., tp. 15-3-Pr., tp. 9-27-Pr., tp. 21-31-Pr., tp. 23-19-2, tps. 3 and 7-20-2, tps. 5 and 7-21-2, tps. 7 and 25-22-2, tp. 6-25-2, tps. 25 and 26-27-2, tp. 20-1-3, tp. 21-9-3, tp. 39-12-3, and tp. 48-20-3. Correction survey in tp. 25-17-2, tp. 40-18-2, tp. 4-29-2, tp. 4-30-2, tp. 14-3-3, tp. 39-13-3, tp. 19-15-3, and tps. 36 and 37-20-3. Investigation in tp. 12-31-Pr.
Rinfret, C.	Montreal, Que.	Stada surveys in tps. 3, 4, 5, 6, 8, 9 and 10-19-2, tps. 9 and 10-20-2, tps. 8, 9 and 10-21-2, tps. 8 and 9-22-2, tps. 8 and 9-23-2, tp. 8-24-2, tps. 8 and 9-25-2, tps. 7, 8, 12 and 13-26-2, tps. 7, 8, 12 and 13-27-2, tps. 7, 12 and 13-28-2, tp. 7-29-2, tps. 7 and 8-30-2, tps. 5, 6 and 7-1-3, tps. 5, 6 and 7-2-3, and tps. 5 and 6-3-3.
Roberts, O. B.	Murray Harbour, P.E.I.	Stadia surveys in tps. 42 and 43-2-4, tp. 42-3-4, tps. 39, 41 and 42-5-4, tps. 38, 39, 40, 41 and 42-6-4, tp. 30-7-4, tps. 39 and 41-8-4, tps. 35, 36, 38, 39, 40, 41 and 42-9-4, tps. 35, 38, 39, 40, 41 and 42-10-4, tps. 39, 40, 41 and 42-11-4, tps. 39, 40, 41 and 42-12-4, tps. 40, 41 and 42-13-4, tps. 37, 38, 40, 41 and 42-14-4, tps. 37, 38, 40, 41 and 42--15-4, tps. 37, 38, 41 and 42-16-4, tps. 37, 38, 39 and 42-17-4, tps. 35, 36, 38 and 39-19-4, and tp. 39-20-4.
Segre, B. H.	Toronto, Ont.	Stadia surveys in tp. 20-22-2, tps. 19 and 20-23-2, tps. 19 and 20-24-2, tps. 17, 18, 19 and 20-25-2, tps. 17, 18, 19 and 20-26-2, tps. 17, 18, 19 and 20-27-2, tps. 17, 18, 19 and 20-28-2, tps. 17, 18, 19, 20 and 24-29-2, tps. 17 and 18-30-2, tps. 17, 18, 19, 20, 23, 24 and 28-1-3, tps. 20, 23 and 24-2-3, tps. 20, 22 and 23-3-3, tps. 19, 20, 21, 22 and 23-4-3, tps. 20, 21 and 22-5-3, tps. 21 and 22-6-3, tps. 19, 20, 21 and 22-7-3, and tps. 21 and 22-8-3.
Seibert, F. V.	Edmonton, Alta.	Survey of the 26th base line from the Fourth to the Fifth meridian.
Soars, H. M. R.	Edmonton, Alta.	Stadia surveys in tp. 60-12-4, tps. 51, 52 and 53-16-4, tps. 50, 51, 52, 53 and 54-17-4, tps. 50, 51, 52, 53, 54 and 58-18-4, tps. 51, 52, 53, 54 and 57-19-4, tps. 51, 52 and 53-20-4, tps. 49, 50, 51 and 52-21-4, tps. 49, 50, 51 and 52-22-4, and tps. 48, 51, 52 and 53-23-4.
Stewart, N. C.	Ottawa, Ont.	Subdivision in tp. 23-18-5, tps. 23 and 24-19-5, tps. 24 and 25-20-5, tps. 25 and 26-21-5, and tp. 26-22-5. Traverse in tps. 23 and 24-18-5, tps 23 and 24-19-5, tps. 24 and 25-20-5, tps. 24, 25, 26 and 27-21-5, and tps. 26 and 27-22-5. Resurvey of lot 11, block 2, in the town of Golden in tp. 27-22-5.
Stock, J. J.	Ottawa, Ont.	Contract No. 8 of 1914. Subdivision of tps. 77 and 78-18-5, tps. 75, 76 and 78-19-5, tp. 78-20-5, and the south two-thirds of tp. 75-20-5.
Street, P. B.	Toronto, Ont.	Subdivision of tp. 70-6-Pr., and partial subdivision of tps. 70 and 71-5-Pr. Survey of the east outlines of tps. 69 and 72-5-Pr., tp. 69-6-Pr., and tp. 69-7-Pr.
Stuart, A. G.	Buckingham, Que.	Survey of the 2nd base line from the Second to the Fourth meridian, the Fourth meridian from the first base line to the north boundary of township 53 and the north boundaries of tp. 48-28-3, tps. 12, 16, 20, 24, 28 and 32-29-3, tps. 12 and 16-30-3, and tps. 12, 16, 20, 24, 28, 32 and 48-1-4. Retracement for bearings of tp. 23-12-Pr., tps. 23, 31, 32 and 33-13-Pr., and part of tp. 30-13-Pr.

SCHEDULE of Surveyors employed and work executed by them from April 1, 1914, to March 31, 1915—*Concluded.*

Surveyor.	Address.	Description of Work.
Taggart, C. H.	Kamloops, B.C.	Subdivision in tp. 20-14-6, tp. 22-16-6, tp. 23-17-6, tp. 23-18-6, tp. 24-19-6, tp. 24-20-6, tps. 21, 23 and 24-21-6, tp. 24-22-6, tp. 24-23-6, tp. 24-24-6, tps. 23 and 24-25-6, and tp. 23-26-6. Traverse in tp. 22-16-6, tp. 23-17-6, and tp. 20-18-6.
Tipper, G. A.	Brantford, Ont.	Contract No. 9 of 1914. Subdivision of tps. 77, 78, 79 and 80-25-5, and tps. 77, 78, 79 and 80-26-5.
Waddell, W. H.	Edmonton, Alta.	Contract No. 7 of 1914. Subdivision of tp. 73-18-5, tps. 73 and 74-19-5, tps. 73 and 74-20-5, tp. 74-21-5, and the south two-thirds of tp. 75-21-5. Survey of the east outline of tp. 73-22-5, and part of the east outline of tp. 75-20-5.
Walker, C. M.	Guelph, Ont.	Resurvey of Canmore townsite, blocks 1 and 2 of Banff townsite, and the north boundary section 32, tp. 24-10-5. Survey of Bankhead cemetery and additions to the townsite and villa lot section of Banff. Contour survey of the southwest slope of Tunnel mountain. Traverse and levels of roads in the vicinity of Banff, and levels and local improvements in the villa lot section of Banff. Supervision of the survey of roads in the Rocky Mountains park and Yoho park.
Wallace, J. N.	Calgary, Alta.	Precise levelling along the Canadian Northern railway from Winnipeg to Swan river, from Portage la Prairie to Lake Manitoba, from Ochre river to Lake Dauphin, from Sifton Junction to Lake Winnipegosis, from Prince Albert to Big river, and from Pas towards Port Nelson, a distance of ninety-nine miles from Pas.
Waugh, B. W.	Ottawa, Ont.	Survey of the 21st base line across ranges 10 and 11, the 22nd base line across ranges 12 to 20, and the 23rd base line across ranges 21 and 22, all east of the Principal meridian. Survey of the Second meridian east from the 23rd to the 24th base line, and the 24th base line across ranges 1 to 10, east of the Second meridian east. Survey of the east outlines of tps. 81, 82, 83 and 84-11-E., and tps. 85, 86, 87 and 88-20-E.

APPENDIX No. 2.

SCHEDULE showing for each surveyor employed, the number of miles surveyed of township section lines, township outlines, traverses of lakes and rivers, and resurvey; also the cost of the same.

Surveyor.	Miles of section.	Miles of outline.	Miles of traverse.	Miles of resurvey.	Total mileage.	Total cost.	Cost per mile.	Day work or contract.
						$	$ cts.	
Akins, J. R.		136			136	20,871	153 46	Day.
Aylsworth, C. F			26	130	156	9,292	59 56	Day.
Bennett, G. A.	10		110	151	271	5,435	20 06	Day.
Blanchet, G. H.		158		2	160	22,812	142 58	Day.
Boivin, E.	226	78	89		393	11,533	29 35	Contract.
Boulton, W. J.			269	2	271	5,405	19 95	Day.
Bowman, E. P.			172	97	269	4,766	17 72	Day.
Brenot, L.	54	89	44	3	190	12,032	63 33	Day.
Buchanan, J. A.	294	78	67		439	13,274	30 24	Contract.
Calder, J. A	122		51		173	9,276	53 62	Day.
Christie, W.	316	79	32		427	13,860	32 45	Day.
Coltham, G. W.			230		230	4,244	18 45	Day.
Cote, J. M.	20		75	330	425	11,863	27 91	Day.
Cowper, G. C.	4		189	41	234	4,925	21 04	Day.
Cumming, A. L.	142	33	121	21	317	15,661	49 40	Day.
Davies, T. A.	270	54	43		367	11,634	31 70	Contract.
Day, H. S.	213	120	90		423	12,583	29 75	Contract.
Evans, S. L.	13	2	32	232	279	9,968	35 73	Day.
Fletcher, J. A.		157			157	25,276	160 99	Day.
Fletcher, W. A.			320	8	328	4,033	12 30	Day.
Francis, J.	210	72	20		302	8,746	28 96	Contract.
Galletly, J. S.	198	88	77		363	12,805	35 28	Day.
Gibbon, J.	48		55		103	10,803	104 88	Day.
Glover, A. E.	294	72	8	6	380	12,511	32 92	Contract.
Green, T. D.	111	28	19		158	9,743	61 66	Day.
Griffin, A. D.	252	113	89		454	13,331	29 36	Contract.
Hawkins, A. H.		60		296	356	38,722	103 15	Day.
Heathcott, R. V.	291	124	77		492	14,773	30 03	Contract.
Herriot, G. H.		240			240	37,000	154 17	Day.
Jackson, J. E.	199	57	82		338	8,966	26 53	Contract
Johnston, J. H.	293	90	127		510	14,416	28 27	Contract
Johnston, W. J.	127		121		248	9,709	39 15	Day
Le Blanc, P. M. H.	309	97	38		444	28,834	64 94	Day
Macleod, G. W.	363	114	52		529	15,636	29 56	Contract
Melhuish, P.	42		54		96	9,086	94 65	Day
McKnight, J. H.			209		209	4,231	20 24	Day
McMaster, W. A. A.			14	76	90	4,400	48 88	Day
Narraway, A. M		99		1	100	14,176	141 76	Day
Neelands, R.			472		472	5,094	10 79	Day
Norrish, W. H.	60		59		119	9,053	76 07	Day
Palmer, P. E.	223	83	87		393	11,008	28 01	Day
Pearson, H. E.	303	138	118		559	15,181	27 16	Contract
Pierce, J. W.	276	130	102		508	15,329	30 17	Contract
Pinder, G. Z.	285	68	15		368	11,751	31 93	Contract
Ponton, A. W.	304	74	6		384	12,415	32 33	Contract
Purser, R. C.	17			89	106	5,568	52 53	Day
Rinfret, C.			283	81	364	4,471	12 29	Day
Roberts, O. B			177	204	381	8,138	21 36	Day
Segre, B. H.			46	34	80	4,585	57 31	Day
Seibert, F. V		146		1	147	25,260	171 84	Day
Soars, H. M. R.			258		258	4,710	18 21	Day
Stewart, N. C.	90		305		395	9,339	23 65	Day
Stock, J. J	260	42	34		336	9,964	29 66	Contract
Street, P. B.	71	53	30		154	8,378	54 40	Day
Stuart, A. G.				739	739	8,327	13 13	Day
Taggart, C. H	111		12		123	10,582	86 03	Day
Tipper, G. A.	401		38		439	13,974	31 83	Contract
Waddell, W. H.	278	90	97		465	13,286	28 57	Contract
Waugh, B. W.		208			208	31,209	150 04	Day
	7,100	3,270	5,141	2,544	18,055	734,253		

APPENDIX No. 3.

SURVEYS in the Yukon Territory, returns of which have been received during the year.

LOT SURVEYS.

GROUP No. 5.

Lot Number.	Acres.	Surveyor.	Year of Survey.	Date of Approval.	Claimant.	Remarks.
147	48·69	H. G. Dickson..	1913	July 4, 1914	Hamilton Yukon Mining Co.	"Canyon" mineral claim.
184	30·57	" ..	1913	" 4, 1914	" " " .	"Palace" "
199	50·56	" ..	1913	" 4, 1914	" " " .	"Wentworth" "
200	51·26	" ..	1913	" 6, 1914	F. J. Nicholson.....	"Brown Cub" "
224	43·19	" ..	1913	" 6, 1914	Henry Baxter.....	"Black Cub" "
227	51·54	" ..	1913	Jan 18, 1915	D. C. Campbell.....	"Wonder" "

GROUP No. 6.

54	49·03	H. G. Dickson..	1913	July 6, 1914	Donald Ross, *et al.*	"Acme" mineral claim.
108	50·51	" ..	1913	" 6, 1914	" "	"Acme" No. 2 "
124	29·44	" ..	1913	" 6, 1914	" "	"Alice" "
125	27·08	" ..	1913	" 6, 1914	" "	"Ross" "
126	51·65	" ..	1913	" 6, 1914	" "	"Comstock" No. 2 "
127	46·93	" .	1913	" 6, 1914	" "	"Comstock" "
128	26·76	" ..	1913	" 6, 1914	" "	"Silver King" "
129	51·61	" ..	1913	" 6, 1914	" "	"Silver King" No. 2 "
130	39·43	" ..	1914	..... .	Howard Cochrane, *et al.*.....	"Rip" "
131	39·43	" ..	1914	.....	" "	"Mavis" "
132	51·65	" ..	1914	....	" "	"Maid Marion" "
133	51·65	" ..	1914	..... .	" "	"Mountain Sheep" "
134	23·89	" ..	1914	.....	" "	"Ptarmigan" "
135	35·48	" ..	1914	....	" "	"Wheaton" "
136	48·16	" ..	1914	.....	" "	"Whirlwind" "
137	33·18	" ..	1914	....	" "	"Idelle" "

GROUP No. 10.

38	51·65	F. H. Kitto ..	1913	May 27, '14.	J. Paul Guite.....	"North Star" mineral claim.
39	44·36	"	1913	" 27, '14.	H. Boulais & J. O. Lachapelle	"Centre Star" "
40	41·88	"	1913	" 27, '14.	O. Vachon, *et al.*.....	"Alice" "
41	50·15	"	1913	" 27, '14.	L. A. Herdt	"Jeanette" "

GROUP No. 12.

6	138·75	F. H. Kitto....	1914	Dec. 9, '14.	C. L. Snell	Homestead.
8	18·4	" ...	1914	Nov. 20, '14.	J. E. Binet.....	Surface.
9	10·00	"	1914	Dec. 9, '14	C. L. Snell.	"

GROUP No. 901.

Lot Number.	Acres.	Surveyor.	Year of Survey.	Date of Approval.	Claimant.	Remarks.
1	160·00	H. G. Dickson..	1913	.....	Skolai Pass Mining Co ...	"Solomon Copper" mineral claim.
2	150·63	" ..	1913	.....	Solomon Albert..... .	"Solomon" Extension No. 1 mineral claim.
3	157·90	" .	1913	....	J. R Slaggard..... .. .	"Solomon" Extension No. 2 mineral claim.
4	91·28	" ..	1913	.....	Mike Day.....	"King Midas Copper" mineral claim.
5	81·35	" ..	1913	Feb. 22, '15.	The N. A. T. & T. Co.....	"Sunrise" mineral claim.
6	49·97	" ..	1913	. ....	H. G. Blankman.....	"Golden Crown" "
7	41·34	" ..	1913	... .. .	"	"Homestake" "
8	36·51	" ..	1913	....	The Skolai Pass Mining Co..	"Lucky Hit" "
9	50·56	" ..	1913	....	" " ..	"Nellie" "
10	51·65	" ..	1913	Mar. 8, '15.	The N. A. T. & T. Co.	"Silver Fox" "
11	51·65	" ..	1913	" 8, '15	" "	"Black Fox" "
12	51·65	" ..	1913	" 8, '15.	" "	"Beaver" "
13	51·65	" ..	1913	" 8, '15.	" "	"Eldorado" "
14	31·88	" ..	1913	....	H. G. Blankman....	"Eastern Star" "
15	22·69	" ..	1913	Mar. 25, '15.	The N. A. T. & T. Co.	"Lost Treasure" "
17	160·00	" ..	1913	.....	Mike Day.....	"Rand" "
18	51·53	" ..	1913	....	"	"New Zealander" "
19	16·81	" ..	1913	.....	The Skolai Pass Mining Co..	"Copper Queen fraction" mineral claim.
20	33·87	" ..	1913	Mar. 25, '15.	The N. A. T. & T. Co	"Susie" mineral claim.
21	38·56	" ..	1913	.....	H. G. Blankman..... ..	"Reta" "
22	46·41	" ..	1913	.....	"	"Lyon" "
23	160·00	" ..	1913	.....	"	"Copper Queen" mineral claim.
24	124·04	" ..	1914	..... .	J. W. McLean.....	"Trust" mineral claim.

GROUP No. 1,054.

1	50·35	F. H. Kitto....	1912	Apr. 4, '15.	J. Stewart & Wm. Catto....	"Victoria" mineral claim.
2	47·90	"	1912	" 4, '15.	" "	"Dublin King" "
3	40·13	"	1912	" 4, '15.	" "	"Happy Jack" "
4	46·60	"	1912	" 4, '15.	" "	"Kootenay" "
5	46·39	" ...	1912	" 4, '15.	" "	"Foundation" "
6	5·67	"	1912	" 4, '15.	" "	"Shamrock" "
7	2·92	"	1912	" 4, '15	" "	"Victoria fraction" "
8	41·51	"	1912	" 4, '15.	S. C. McKim..... ...	"Aien Aristenein" "
9	5·1	" ...	1914	Nov. 20, '14.	J. E. Binet..	Surface
10	5·0	"	1914	" 20, '14.	Schogrin & Chasni.....	"

MISCELLANEOUS SURVEYS.

Year.	Surveyor.	Description of Survey.
1914..	F. H. Kitto.....	Reference traverse between Bedrock creek and international boundary.
1913..	H. G. Dickson....	Continuation Aishihik Lake Reference traverse.
1913..	"	Reference traverse Bullion creek to Kluane lake.
1913..	"	Base Line on Fourth of July Creek.
1913..	"	Section "E" (Ore Spur) British Yukon Railway Co.
1913..	" ...	Whitehorse Kluane Government Road.
1914..	F. H. Kitto... ...	Base Lines on Sixty-mile creek and tributaries, California, Twelve-mile and Five-mile creeks.

APPENDIX No. 4.

DETAILS OF THE OFFICE WORK.

Letters and memoranda drafted	15,077
Letters of instruction to surveyors	321
Applications for various information dealt with	3,220
Sketches made	6,384
Maps and tracings made	282
Areas calculated	614
Pages of field notes copied	345
Descriptions written	30
Progress sketches received and filed	1,600
Declarations of settlers received and filed	229
Returns of timber berths received	7
Plans received from surveyors	1,111
Field books received from surveyors	889
Timber reports received	251
Observations for magnetic declination received	1,439
Plans of Yukon lots received	62
Plans of miscellaneous Yukon surveys received	7
Returns of surveys examined:—	
Township subdivision	842
Township outline	563
Road plans	541
Railway plans	85
Miscellaneous Yukon surveys	7
Yukon lots	62
Mineral claims	91
Timber berths	7
Correction and other miscellaneous surveys	217
Preliminary township plans prepared	382
Township plans compiled	905
Townsite settlement and other plans compiled	39
Proofs of plans examined	130
Township plans printed	704
Township plans reprinted	244
Townsite and settlement plans printed	13
Sectional maps (3 miles to 1 inch):—	
Revised and reprinted	15
Reprinted but not revised	8
New maps compiled and printed	14
Sectional maps (6 miles to 1 inch):—	
Reprinted	14
New maps printed	12
Files received and returned	1,968
Books received from Record Office and used in connection with office work	5,657
Books returned to Record Office	4,167
Plans other than printed township plans received from Record Office and used in connection with office work	1,046
Plans returned to Record Office	775
Volumes of plans received from Record Office and used in connection with office work	142
Volumes of plans returned to Record Office	75
Books sent to Record Office to be placed on record	780
Plans other than township plans sent to Record Office to be placed on record	180

APPENDIX No. 5.

SECTIONAL MAPS, of which new editions have been issued.

Scale, 3 miles to 1-inch.

No.	Name.	No.	Name.
20	Souris.	372	Minago.
66	Medicine Hat.	412	Wapiti.
113	Spillimacheen.	413	Iosegun.
114	Calgary.	414	Saulteux.
162	Seymour.	415	Tawatinaw.
172	Fairford.	416	La Biche.
173	Washow.	423	Sipiwesk.
213	Athabaska.	442	Wekusko.
263	Jasper.	462	Dunvegan.
314	St. Ann.	464	Giroux.
316	Vermilion.	465	Pelican.
317	Fort Pitt.	512	Montagneuse.
318	Shell River.	513	Heart River.
319	Prince Albert North.	515	Wabiskaw.
321	Cedar Lake.	563	Notikewin.
364	Fort Assiniboine.	566	McKay.
367	Meadow Lake.	663	Mustus.
368	Green Lake.	664	Mikkwa.
371	Cowan River.		

Scale, 6 miles to 1-inch.

20	Souris.	412	Wapiti.
113	Spillimacheen.	413	Iosegun.
173	Washow.	416	La Biche.
263	Jasper.	462	Dunvegan.
314	St. Ann.	464	Giroux.
316	Vermilion.	465	Pelican.
317	Fort Pitt.	512	Montagneuse.
318	Shell River.	513	Heart River.
319	Prince Albert North.	515	Wabiskaw.
321	Cedar Lake.	563	Notikewin.
367	Meadow Lake.	566	McKay.
368	Green Lake.	663	Mustus.
371	Cowan River.	664	Mikkwa.

APPENDIX No. 6.

Work executed in the Photographic Office.

—	3¼ x 3¼	3¼ x 5½	5 x 7	8 x 10	10 x 12	11 x 14	15 x 18	18 x 20	20 x 24	24 x 32	25 x 35	30 x 36	36 x 42	42 x 48	Total.
Dry plates and films		18	657			64									739
Bromide prints		15	4	87	43	1,938	284	105	59	63		15	41	65	2,719
Solio prints			139	51											190
Vel x prints	50	218	5,547	1,030		101									6,946
Vandyke prints			47	6		15	21	49	44	167		47	34	45	478
Blue-prints			2	27	21	166	186	186	205	274		279	120	202	1,668
Lantern slides	23														23
Photographs mounted		6	2,194			26	75		1	12					2,314
Wet plate negatives				101		296	1,310	258	73	100					2,138
Photo-litho plates								105	11		6	475			597
	73	257	8,590	1,302	64	2,606	1,879	703	393	616	6	816	195	312	17,812

APPENDIX No. 7.

Work executed in the Lithographic Office.

	Maps.			Township Plans.			Forms.		
	No.	Copies.	Impressions.	No.	Copies.	Impressions.	No.	Copies.	Impressions.
1914.									
April	11	1,881	3,606	133	26,100	41,000	9	3,920	4,370
May	20	54,673	186,998	53	10,600	10,800	30	12,400	12,400
June	21	6,918	18,379	85	16,600	21,200	8	2,510	2,510
July	41	13,600	32,650	94	21,200	33,000	4	720	720
August	13	3,537	5,285	142	28,400	48,800	4	1,400	1,500
September	19	8,206	17,206	43	8,600	8,800	4	2,650	2,650
October	5	6,725	14,450	68	13,600	16,000	9	16,200	16,200
November	10	3,275	7,450	112	22,400	36,800	1	200	400
December	....	.....	....	70	13,600	13,600	4	775	775
1915.									
January	7	2,015	6,015	...	....	....	8	1,950	1,950
February	22	29,000	103,400	55	11,000	11,000	7	26,060	26,060
March	20	6,275	6,370	192	38,400	70,800	16	12,500	12,500
Total	189	136,105	401,809	1047	210,500	311,800	104	81,285	82,035

Recapitulation.

	No.	Copies.	Impressions.	Cost.
				$ cts.
Maps	189	136,105	401,809	3,616 29
Township plans	1,047	210,500	311,800	2,800 00
Forms	104	81,285	82,035	738 32
Grand total	1,340	427,890	795,644	7,154 61

APPENDIX No. 8.

OFFICE STAFF of the Topographical Surveys Branch at Ottawa, as on April 1, 1915, with the name, classification, duties of office and salary of each. (Metcalfe street, corner of Slater.)

NAME.	CLASSIFICATION.		Duties of Office.	Salary.
	Division.	Sub-division.		
				$
Deville, E., D.T.S., LL.D	1	A	Surveyor General	4,000
Shanks, T., B.A.Sc., D.L.S	1	A	Asst. Surveyor General	2,400
	Correspondence.			
Brady, M	1	B	Secretary	2,700
Cullen, M. J	3	A	Clerk	1,200
Williams, E. R	3	A	"	1,100
Addison, W. G	3	A	Stenographer	1,000
Renault, J. F	3	B	"	800
Laforce, D	3	B	"	500
Pegg, A			Messenger	800
O'Meara, M. T			"	700
	Accounts.			
Hunter, R. H	2	A	Accountant	2,100
Lemay, A	2	A	Asst. accountant	1,700
McPhail, N. R	2	B	"	1,050
	Field work.			
Brown, T. E., B.A	1	B	Supervisor of field work	2,800

DIVISION I.

Survey Instructions and General Information.

Barber, H. G., Grad. S.P.S, D.L.S	1	B	Chief of division	2,300
Rice, F. W., Grad. School of Min., D.L.S	2	A	Technical clerk	2,050
MacIlquham, W. L., B.Sc., D.L.S	2	A	"	2,050
Peaker, W. J., Grad. S.P.S	2	A	"	1,750
Carroll, M. J., Grad. S.P.S	2	A	"	1,750
Rochon, E. C	2	A	"	1,700
McRae, A. D., B.A., B.Sc	2	A	Supply clerk	1,700
Grant, A. W., B.A	2	A	Editor	1,700
Hayward, H. E., B.Sc	2	A	Registration clerk	1,650
Macmillan, J. P., B.E	2	B	Technical clerk	1,450
Gagnon, J. N. H., B.A.S	2	B	"	1,200
Armstrong, W. B., B.Sc	2	B	"	1,350
Nevins, L. A., B.A	2	B	"	1,350
McDonald, J. F., B.A	2	B	Registration clerk	1,350
Quinlan, L. J., B.A.Sc	2	B	Technical clerk	1,300
Gallaher, O. G., B.Sc	2	B	"	1,250
Miller, A. H., B.A	2	B	"	1,250
Morgan, A. L., B.Sc	2	B	"	1,200
Campbell, D. H., B.A.Sc	2	B	"	1,200
Burkholder, E.L	3	A	Clerk	1,100

APPENDIX No. 8—*Continued.*

DIVISION II.

Examination of Survey Returns and Compilation of Plans.

Name.	Classification. Division	Sub-division.	Duties of Office.	Salary.
				$
Nash, T. S., Grad. S.P.S., D.L.S.	1	B	Chief of division	2,800
Dennis, E. M., B. Sc., D.L.S.	1	B	Surveys examiner	2,200
Hill, S. N., Grad. S.P.S., C.E.	1	B	"	2,200
Elder, A. J., Grad. S.P.S., D.L.S.	2	A	"	2,050
Genest, P. F. X., Q.L.S.	2	A	"	2,050
McClennan, W. D	2	A	"	1,750
Roger, A., O.L.S., D.L.S.	2	A	"	1,750
Sutherland, H. E., B.Sc.	2	A	"	1,700
Ault, H. W	2	A	"	1,700
Bray, R. P.	2	A	"	1,700
Spreckley, R. O	2	A	"	1,650
Goodday, Leonard	2	B	"	1,550
Harrison, E. W	2	B	"	1,450
Lytle, W. J.	2	B	Recorder	1,200
LaBeree, E. E.	2	B	Surveys examiner	1,200
Jones, G. S., Grad. S.P.S., O.L.S., D.L.S.	2	B	"	1,200
Bradley, J. D.	2	B	"	1,200
Kirwan, G. L., B.A.Sc	2	B	"	1,300
Callander, R., B.Sc.	2	B	"	1,250
Cram, R. M., B.Sc	2	B	"	1,250
Timbrell, E. G., B.Sc.	2	B	"	1,250
Fraser, A., B.A.Sc	2	B	"	1,200
DesLauriers, J	2	B	"	1,600
Macdonald, J. A.	3	B	Clerk	800

DIVISION III.

Drafting and Printing, (Imperial Building, Queen street.)

Engler, Carl, B.A., D.L.S.	1	B	Chief of division	2,400
May, J. E.	2	A	Draughtsman	2,050
Moule, W. J.	2	B	Litho-designer	1,600
Helmer, J. D.	2	B	Draughtsman	1,250
Dawson, R. J.	2	B	Stamper	1,250
Archambault, E.	2	B	Draughtsman & stamper	1,250
Birchall, W. A.	2	B	Draughtsman	1,200
Hall, J.	2	B	"	1,200
Watters, James	3	A	Printer	1,200
Brown, A.	3	A	Stamper	1,100
Ebbs, E. J.	3	A	"	1,100
Baril, C	3	A	Clerk	950

DIVISION IV.

British Columbia Surveys, (Imperial Building, Queen street.)

Rowan-Legg, E. L	2	A	Chief of division	2,100
Gillmore, E. T. B., Grad. R.M.C.	2	A	Surveys examiner	2,100
Morley, R. W	2	A	"	2,050
Wilson, E. E. D., B.Sc.	2	A	"	1,800
Harris, K. D	2	A	"	1,650

APPENDIX No. 8—*Continued.*

DIVISION V.

Mapping, (Imperial Building, Queen street.)

Name.	Classification. Division	Sub-division	Duties of Office.	Salary.
				$
Smith, J.	1	B	Chief of division	2,800
Henderson, F. D., Grad. S.P.S., D.L.S.	1	B	Technical clerk	2,200
Bégin, P. A.	2	A	Draughtsman	2,100
Blanchet, A. E.	2	A	"	1,650
D'Orsonnens, A.	2	A	"	1,750
Flindt, A. H.	2	A	"	1,850
Davies, T. E. S.	2	A	Recorder	1,650
Purdy, W. A.	2	A	Draughtsman	1,650
Bergin, W.	2	B	"	1,250
Blanchard, J. F	2	B	Technical clerk	1,250
Colquhoun, G. A., B.Sc.	2	B	" "	1,350
Davy, E	2	B	Draughtsman	1,550
Fitzgerald, C.C., B.Sc.	2	B	Technical clerk	1,200
Hawes, J. H. B.A. Sc	2	B	" "	1,200
Howie, Jas.	2	B	Draughtsman	1,200
Perrin, V.	2	B	"	1,600
Squire, R. L., B.Sc.	2	B	Technical clerk	1,250
Villeneuve, E.	2	B	Draughtsman	1,250

DIVISION VI.

Special Surveys, (Imperial Building, Queen street.)

Dodge, G. B., D.L.S.	1	B	Chief of division and Supt. Surveys Laboratory	2,800
Watt, G. H. Grad. S.P.S., D.L.S.	2	A	Computer	2,050
Way, W. C., M.Sc	2	A	Asst. Supt. Sur. Laboratory	1,700
Milliken, J. B., B.A., B.Sc., D.L.S.	2	A	Examiner of baseline survey	1,650
Parry, H., B. Eng. D.L.S.	2	A	Mathematician	1,650
Cannell, H. W., D.L.S.	2	A	Computer	1,600
Doxsee, W. W. M.A.	2	B	Laboratory assistant	1,200
Dunlop, J. H., B.Sc.	2	B	Computer	1,200
Field, R. H.	2	B	Laboratory assistant	1,200
Herbert, W. H., B.Sc.	2	B	Computer	1,350
Hughson, W. G., B.Sc.	2	B	Laboratory assistant	1,300
Jeffrey, Miss G., B.A	2	B	Computer	1,200
Linford, W. J.	2	B	Laboratory assistant	1,200
Roe, B. J.	2	B	Computer	1,300
Ross, R. C., B.Sc.	2	B	"	1,350
Lynch, F. J.	3	B	Stenographer	800
Watson, J. W.	3	B	Clerk	800
Pick, A. C.			Messenger	700

Chief Inspector of Surveys Office, (130 Wellington Street.)

Hubbell, E. W., D.L.S	1	B	Chief Inspector	2,800
Sylvain, John.	2	B	Assistant	1,850
Stalker, Miss M. W.	3	A	Stenographer	1,100

Board of Examiners for D.L.S.

Côté, J. A., Grad. R.M.C.	2	A	Secretary	1,800
Nolan, Miss A. A.	3	B	Stenographer	550

APPENDIX No. 8—*Concluded.*

Geographic Board, (Woods Building, Slater street.)

Name.	Classification.		Duties of Office.	Salary.
	Division	Sub-division		
				$
Whitcher, A. H., F.R.G.S., D.L.S.	2	A	Secretary.	2,100

Photographic Office, (Metcalfe street, corner Slater street.)

Carruthers, H. K.	2	A	Process photographer.	2,050
Woodruff, John	2	A	Chief "	2,050
Collins, G. H. A.	2	B	Photographer	1,050
Whitcomb, H. E.	3	A	"	1,200
Morgan, W. E.	3	A	"	1,200
Kilmartin, A.	3	A	Asst. photographer.	1,100
Ouimet, E. G.	3	B	" "	1,000
Bourbeau, J. A.			" "	700

Lithographic Office, (Imperial Building, Queen street.)

Name.	Occupation.	Salary.
Moody, A.	Foreman	$27 00 per week.
Burnett, E	Lithographer	25 00 "
Thicke, C. R.	"	23 00 "
Deslauriers, J. H.	Transferrer	20 00 "
Bergin, J.	Printer	21 00 "
Thicke, H. S.	"	20 00 "
Boyle, S	Stone polisher	15 00 "
Gagnon, J	Press feeder	12 00 "
Kane, P.	"	9 50 "
Easton, R. M.	Printer	19 50 "
Hare, E. H.	Asst. photographer	15 00 "

SESSIONAL PAPER No. 25

APPENDIX No. 9.

List of Dominion Land Surveyors who are in possession of Standard Measures.

Name.	Address.	Date of Birth.	Date of Appointment or of Commission.	Remarks.
Akins, James Robert	Ottawa, Ont	Sept. 2, '76	Mar. 14, '10	
Allison, Calvin Bruce	South Woodslee, Ont.	June 16, '84	Mar. 28, '10	O.L.S.
Ashton, Arthur Ward	Not known.	Nov. 5, '80	May 29, '08	B.C.L.S.
Austin George Frederick	Not known	.....	April 14, '72	
Aylen, John	North Bay, Ont	.....	May 29, '85	
Aylsworth, Charles Fraser	Madoc, Ont	April 21, '62	May 13, '86	O.L.S.
Baker, James Clarence	Vermilion, Alta	May 12, '78	May 18, '06	A.L.S.
Baker, Mason Hermon	St. Thomas, Ont	July 9, '84	Aug. 6, '08	O.L.S.
Bartlett, Ernest	Medicine Hat, Alta.	——— '83	Jan. 16, '11	A.L.S.
Bayne, George A.	Winnipeg, Man	Oct. 25, '50	April 14, '72	M.L.S.
Beatty, David	Parry Sound, Ont	Dec. 22, '42	April 14, '72	O.L.S.
Beatty, Frank Weldon	Pembroke, Ont	July 12, '92	May 18, '14	
Begg, William Arthur	Hamilton, Ont	July 15, '82	June 8, '09	S.L.S.
Belanger, Phidime Roch Arthur	Ottawa, Ont	Mar. 5, '53	May 17, '80	Inspector of Surveys, Topographical Surveys Branch, Dept. of the Interior.
Belleau, Joseph Alphonse	Ottawa, Ont	Sept. 30, '56	May 15, '83	Land Patents Branch, Department of Interior.
Belyea, Albert Palmer Corey	Edmonton, Alta	.....	July 14, '09	A.L.S.
Bemister, George Bartlett	Winnipeg, Man	.....	June 11, '78	M.L.S. Engineering Dept. C.N.R.
Bennett, George Arthur	Ottawa, Ont	May 18, '86	Aug. 25, '10	A.L.S.
Berry, Edward Wilson	Seaforth, Ont	Aug. 26, '81	May 18, '11	
Bigger, Charles Albert	Ottawa, Ont	Aug. 15, '53	Mar. 30, '82	B.C.L.S., O.L.S., Assistant Superintendent Geodetic Surveys.
Bingham, Edwin Ralph	Fort William, Ont.	——— '78	Oct. 25, '06	O.L.S.
Bingham, Harold Carr	Moosejaw, Sask	Aug. 7, '88	Mar. 13, '14	S.L.S.
Blanchet, Guy Houghton	Ottawa, Ont	Feb. 12, '84	Mar. 10, '10	
Boivin, Elzear	Edmonton, Alta	June 13, '57	Nov. 13, '83	
Boswell, Elias John	Montreal, Que	Sept. 26, '70	Mar. 18, '03	O.L.S., M.L.S.
Boulton, William James	Wallaceburg, Ont	Oct. 2, '84	Mar. 7, '12	
Bourgeault, Armand	St. Jean Port Joli, Que	Feb. 23, '58	Mar. 29, '83	Q.L.S.
Bourgault, Charles Eugene	Lauzon, Levis, Que.	Sept. 6, '61	Feb. 21, '88	
Bourget, Charles Arthur	Lauzon, Que	Aug. 26, '51	May 14, '84	Q.L.S.
Bowman, Edgar Peterson	West Montrose, Ont.	Sept. 29, '83	Sept. 26, '07	O.L.S.
Bowman, Herbert Joseph	Berlin, Ont	June 18, '65	Feb. 16, '88	O.L.S.
Brabazon, Alfred James	Ottawa, Ont	.....	May 13, '82	Boundary Surveys, Dept. of the Interior.
Bray, Samuel	Ottawa, Ont	Nov. 5, '46	Nov. 14, '83	O.L.S., Chief Surveyor, Dept. of Indian Affairs.
Bray, Lennox Thomas	Edmonton, Alta	Mar. 14, '77	Feb. 18, '03	O.L.S., A.L.S.
Brenot, Lucien	Ottawa, Ont	Aug. 31, '87	Mar. 18, '10	
Bridgland, Morrison Parsons	Calgary, Alta	Dec. 20, '78	Mar. 10, '05	A.L.S.
Broughton, George Henry	Penticton, B.C	Aug. 12, '86	June 3, '09	B.C.L.S.
Brown, Charles Dudley	Winnipeg, Man	Feb. 25, '83	April 4, '10	A.L.S., S.L.S.
Brown, Edgar Carl	Winnipeg, Man	Nov. 28, '86	May 23, '11	A.L.S., S L S.
Brown, Thomas Wood	Saskatoon, Sask	Nov. 10, '79	June 21, '09	A.L.S., S.L.S.
Brownlee, James Harrison	Vancouver, B. C	Mar. 22, '56	April 15, '87	M.L.S., B.C.L.S, Director of Surveys, Yukon Territory.
Buchanan, John Alexander	Edmonton, Alta	Mar. 4, '87	May 17, '12	A.L.S.
Burd, James Henry	Weyburn, Sask	Sept. 7, '71	May 18, '11	O.L.S., S L.S.
Burgess, Edward LeRoy	Kamloops, B.C	May 5, '78	Feb. 23, '05	O.L.S.
Burnet, Hugh	Victoria, B.C	....	June 22, '85	O.L.S., B.C.L.S.
Burwash, Nathaniel Alfred	Toronto, Ont	Sept. 28, '79	Mar. 6, '07	O.L.S.
Burwell, Herbert Mahlon	Vancouver, B.C	Oct. 23, '63	Feb. 17, '87	B.C.L.S.
Calder, John Alexander	Lytton, B.C	June 2, '86	May 21, '12	
Cameron, Charles Scott	Beaverton, Ont.	Dec. 6, '84	Mar. 15, '13	
Campbell, Alan John	Sidney, B.C.	Oct. 1, '82	April 13, '09	B.C.L.S., A.L.S.
Campbell, Alexander Stewart	Kingston, Ont	Mar. 7, '80	Mar. 6, '09	O.L.S.

APPENDIX No. 9—*Continued.*

List of Dominion Land Surveyors who are in possession of Standard Measures.—*Continued.*

Name.	Address.	Date of Birth,	Date of Appointment or of Commission.	Remarks.
Carbert, Joseph Alfred	Medicine Hat, Alta.	Feb. 4, '56	May 12, '80	O.L.S., A.L.S., District Engineer and Surveyor, Dept. of Public Works, Alberta.
Carpenter Henry Stanley	Regina, Sask.	Feb. 8, '74	Feb. 20, '01	O.L.S., S.L.S., Department of Public Works.
Carroll, Cyrus	Regina, Sask.	Dec. 6, '34	April 14, '72	O.L.S., S.L.S.
Carson, John Alton	Vancouver, B.C.	Aug. 10, '89	May 18, '14	
Carson, Percy Alexander	Calgary, Alta.	Dec. 25, '77	Feb. 22, '06	
Carthew, William Morden	Edmonton, Alta.	Oct. 19, '86	Mar. 29, '10	A.L.S.
Carthew, John Trewalla	Edmonton, Alta.	Feb. 15, '91	Mar. 15, '13	
Cautley, Reginald Hutton	Edmonton, Alta.	Dec. 6, '79	May 1, '05	A.L.S.
Cautley, Richard William	Edmonton, Alta.	Aug. 3, '73	Sept. 2, '96	A.L.S.
Cavana, Allan George	Orillia, Ont.	Jan. 22, '58	Nov. 16, '76	O.L.S.
Charlesworth, Lionel Clare	Edmonton, Alta.	Nov. 17, '73	Mar. 24, '03	O.L.S., A.L.S., Director of Surveys, Dept. of Public Works, Alberta.
Chase, Albert Victor	Orillia, Ont.	Mar. 4, '83	Oct. 11, '10	O.L.S.
Chilver, Charles Alonzo	Walkerville, Ont.	Feb. 8, '83	Feb. 22, '07	
Christie, William	Prince Albert, Sask	Feb. 13, '76	Mar. 22, '06	S.L.S.
Clarke, Frederick Fieldhouse	Toronto, Ont.	Aug. 22, '78	Feb. 18, '08	O.L.S.
Clarke, Charles Wentworth	Regina, Sask.	Nov. 19, '75	Mar. 24, '10	S.L.S.
Cleveland, Ernest Albert	Vancouver, B.C.	May 12, '74	June 27, '99	B.C.L.S.
Coates, Preston Charles	Victoria, B.C.	May 16, '81	April 19, '07	B.C.L.S.
Cokely, Leroy S.	Duncan, B.C.	Nov. 23, '84	Mar. 22, '10	B.C.L.S
Coltham, George William	Auroa, Ont.	Feb. 19, '89	Mar. 15, '13	O.L.S.
Cond, Fritz Thomas Percy	Vancouver, B.C.	May 16, '86	May 18, '11	B.C.L.S.
Côté, Joseph Adelard	Prince Albert, Sask	June 5, '64	May 14, '84	S.L.S.
Côté, Jean Léon	Edmonton, Alta.	May 6, '67	Mar. 21, '90	A.L.S.
Côte, Joseph Martial	Ottawa, Ont	Aug. 25, '89	May 13, '13	
Cotton, Arthur Frederick	Massett, B.C.	Aug. 8, '52	May 11, '80	O.L.S., B.C.L.S.
Cowper, George Constable	Welland, Ont.	Oct. 20, '86	Mar. 11, '11	
Craig, John Davidson	Ottawa, Ont	Jan. 30, '76	Feb. 24, '02	Boundary Surveys, Dept. of the Interior.
Cumming, Austin Lewis	Edmonton, Alta.	Aug. 25, '82	Feb. 3, '10	A.L.S
Cummings, Alfred	Fernie, B.C.	July 3, '80	Mar 3, '09	B.C.L.S.
Cummings, John George	Cranbrook, B.C.	Nov. 19, '73	Feb. 17, '04	B.C.L.S.
Dalton, John Joseph	Weston, Ont	June 12, '54	April 17, '79	O.L.S., D.T.S.
Davies, Thomas Atwood	Edmonton, Alta.		Feb. 22, '06	A.L.S.
Dawson, Frederick James	Kamloops, B.C.	Sept. 22, '86	Sept. 12, '10	B.C.L.S
Day, Harry Samuel	Edmonton, Alta.	Nov. 14, '85	Mar. 9, '10	A.L.S.
Deans, William James	Brandon, Man.	May 4, '60	May 13, '86	O.L.S., Inspector of Surveys, Dept. of the Interior.
de la Condamine, C	Calgary, Alta.	Feb. 13, '75	May 4, '10	A.L.S.
Dennis, John Stoughton	Calgary, Alta.	Oct. 22, '56	Nov. 19, '77	D.T.S., Asst. to President of C.P.R.
Denny, Herbert C	Not known.		April 1, '82	
Dickson, Henry Godkin	Whitehorse, Y.T.	Mar. 29, '64	Mar. 19, '89	M.L.S.
Dickson, James	Fenelon Falls, Ont.	Oct. 30, '34	April 14, '72	O.L.S.
Dobie, James Samuel	Thessalon, Ont.	Oct. 15, '73	Mar. 22, '06	O.L.S.
Donnelly, Cecil	Winnipeg, Man.	Oct. 18, '89	Mar. 15, '13	M.L.S.
Doupe, Jacob Lonsdale	Winnipeg, Man.	Sept. 14, '67	Oct. 6, '88	M.L.S., A.L.S., S.L.S., Assist. Land Commissioner for C.P.R.
Drewry, William Stewart	Victoria, B.C.	Jan. 20, '59	Nov. 14, '83	O.L.S., B.C.L.S.
Driscoll, Alfred	Edmonton, Alta.	July 2, '65	Feb. 23, '87	B.C.L.S,, A.L.S.
Drummond, Thomas	Montreal, P.Q.	...1856	June 24, '78	D.T.S.
Ducker, William A.	Winnipeg, Man.	April 4, '52	Mar. 30, '83	O.L.S., M.L.S.
Duffield, Hugh Johnston	Calgary, Alta.	Feb. 27, '72	May 18, '14	
Dumais, Paul T. Concorde	Hull, P.Q.	Jan. 2, '47	Mar. 29, '82	Q.L.S.
Earle, Wallace Sinclair	Vancouver, B.C.	Feb. 8, '89	May 18, '11	B.C.L.S., O.L.S.
Edwards, George	Ponoka, Alta.	June 13, '42	April 14, '72	O.L.S., A.L.S.

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APPENDIX No. 9—*Continued.*

List of Dominion Land Surveyors who are in possession of Standard Measures—*Continued.*

Name.	Address.	Date of Birth.	Date of Appointment or of Commission.	Remarks.
Edwards, William Milton	Lethbridge, Alta	June 21, '79	April 5, '10	A.L.S.
Ellacott, Charles Herbert	Victoria, B.C.	Dec. 24, '66	Feb. 22, '99	B.C.L.S
Ellis, Douglas Stewart	Kingston, Ont	Mar. 16, '85	May 17, '12	
Empey, John Morgan	Calgary, Alta	Apr. 16, '74	Feb. 23, '05	O.L.S., A.L.S.
Engler, Carl	Ottawa, Ont	Sept. 30, '72	Feb. 23, '05	T. S. Branch, Dept. of the Interior.
Evans, Stanley Livingstone	Corinth, Ont	Jan. 14, '84	Feb. 13, '11	
Ewan, Hedley Jenkins	Yarmouth N.S.	Nov. 23, '91	Mar. 13, '14	
Fairchild, Charles Courtland	Edmonton, Alta.	Feb. 21, '67	Feb. 20, '01	O.L.S., A.L.S.
Farncomb, Alfred Ernest	Edmonton (South) Alta.	May 22, '73	Mar. 12, '02	O.L.S., A.L.S.
Fawcett, Adam	Gravenhurst, Ont.		Feb. 22, '93	
Fawcett, Sydney Dawson	Ottawa, Ont	Oct. 29, '82	May 18, '11	
Fawcett, Thomas	Ottawa, Ont	Oct. 28, '48	Nov. 18, '76	O.L.S., D.T.S. Boundary Surveys Dept. of the Interior.
Ferguson, George Hendry	Ottawa, Ont.	Jan. 20, '83	June 2, '09	
Findlay, Allan	Winnipeg, Man.	Oct. 15, '80	Mar. 21, '08	M.L.S.
Fletcher, James Allan	Fletcher, Ont.	Mar. 26, '89	May 18, '11	
Fontaine, Louis Elie	Levis, P.Q.	Oct. 3, '68	Nov. 30, '92	A.L.S., Inspector of Surveys, Dept. of the Interior.
Francis, John	Portage la Prairie, Man.	Dec. 22, '52	June 17, '75	M.L.S.
Galletly, James Simpson	Oshawa, Ont.	April 15, '88	May 18, '11	
Garden, James Ford	Vancouver, B. C.	Feb. 19, '47	May 13, '80	B.C.L.S.
Garden, George H	Lethbridge, Alta.		April 14, '72	Deputy Surveyor for N.B.
Garden, Charles	Not known		April 14, '72	Deputy Surveyor for N.B.
Garner, Albert Coleman	Regina, Sask	Sept. 6, '78	May 27, '07	S.L.S., A.L.S. Chief Surveyor Surveys Branch Land Titles Offices.
Gauvreau, Louis Pierre	Not known		April 14, '72	
Gibbon, James	Vancouver, B. C.	June 25, '60	Feb. 12, '91	O.L.S.
Glover, Arthur Edward	Edmonton, Alta.	Mar. 4, '87	Mar. 11, '11	A.L.S., S.L.S.
Gordon, Maitland Lockhart	Vancouver, B. C.	Sept. 27, '82	Feb. 18, '04	B.C.L.S.
Gordon, Robert John	Lethbridge, Alta.	June 18, '69	Mar. 12, '02	A.L.S.
Gore, Thomas Sinclair	Victoria, B.C.	1852	April 19, '79	B.C.L.S.
Graham, John Robertson	Vancouver, B. C.	April 18, '87	May 26, '10	B.C.L.S.
Grassie, Charles Andrew	Medicine Hat, Alta.	Dec. 24, '83	Dec. 27, '10	A.L.S.
Gray, James Edward	Edmonton, Alta.	Oct. 12, '81	Mar. 11, '11	A.L.S., S.L.S.
Green, Alfred Harold	Nelson, B.C.	Jan. 20, '79	Feb. 23, '05	B.C.L.S., A.L.S.
Green, Thomas Daniel	Rocky Mountain House, Alta.	Dec. 21, '57	May 19, '84	O.L.S.
Green, Frank Compton	Victoria, B.C.	May 4, '73	May 8, '03	B.C.L.S.
Griffin, Albert Dyke	Elk Lake, Ont	Dec. 14, '60	May 13, '13	O.L.S.
Grover, George Alexander	Toronto, Ont.		Feb. 18, '04	
Haggen, Rupert Williams	Quesnel, B.C.	July 29, '87	May 18, '11	B.C.L.S.
Hamilton, Charles Thomas	Vancouver, B. C.	July 29, '84	May 18, '11	B.C.L.S.
Hamilton, James Frederick	Lethbridge, Alta.	April 4, '69	June 2, '09	A.L.S.
Harris, John Walter	Winnipeg, Man.	Feb. 26, '45	April 14, '72	O.L.S., M.L.S., Assessment Commissioner and City Surveyor.
Harrison, Edward	Calgary, Alta.		May 14, '10	A.L.S.
Harvey, Charles	Kelowna, B.C.	May 5, '76	Feb. 17, '04	B.C.L.S.
Hawkins, Albert Howard	Listowel, Ont.	July 27, '62	Mar. 6, '06	
Heaman, John Andrew	Winnipeg, Man.	June 3, '75	July 15, '09	O.L.S.
Heathcott, Robert Vernon	Edmonton, Alta.	July 7, '81	May 13, '07	A.L.S.
Henderson, Walter	Not known		Nov. 17, '83	
Hermon, Ernest Bolton	Vancouver, B.C.		June 22, '85	
Herriot, George Henry	Souris, Man.	Feb. 23, '83	Sept. 18, '09	M.L.S.
Heuperman, Frederick Justinus	Calgary, Alta.	July 23, '87	Mar 13, '11	A.L.S.
Heuperman, Lambertus Fred	Calgary, Alta.	Sept. 20, '81	Mar. 29, '10	A.L.S.
Hoar, Charles Millard	Calgary, Alta.	Sept. 26, '85	Mar. 9, '11	A.L.S.
Hobbs, Wilfrid Ernest	Winnipeg, Man.	Mar. 12, '87	Mar. 5, '12	M.L.S.

APPENDIX No. 9—*Continued.*

LIST of Dominion Land Surveyors who are in possession of Standard Measures.—*Continued.*

Name.	Address.	Date of Birth.	Date of Appointment or of Commission.	Remarks.
Holcroft, Herbert Spencer	Toronto, Ont	Sept. 4, '77	Feb. 18, '03	O.L.S.
Hopkins, Marshall Willard	Edmonton, Alta	May 24, '61	Feb. 20, '01	O.L.S., A.L.S.
Hubbell, Ernest Wilson	Ottawa, Ont	Nov. 5, '62	May 19, '84	Chief Inspector of Surveys, Dept. of the Interior.
Inkster, Oluff	Edmonton, Alta	Mar. 25, '85	May 18, '11	A.L.S.
Jackson, John Edwin	Hamilton, Ont	Dec. 27, '81	May 18, '11	O.L.S.
James, Silas	Toronto, Ont	June 19, '34	Apr. 14, '72	O.L.S.
Jephson, Richard Jermy	Brandon, Man	Feb. 5, '54	May 12, '80	O.L.S., B.C.L.S., M.L.S.
Johnson, Alfred William	Kamloops, B.C.	Feb. 23, '74	Mar. 12, '02	B.C.L.S.
Johnston, Percy Nowell	Edmonton, Alta	Oct. 4, '75	May 10, '09	
Johnston, James Homer	Edmonton, Alta	Aug. 23, '87	May 17, '12	A.L.S.
Johnston, William James	St. Catharines, Ont	Jan. 31, '81	Mar. 11, '11	
Keith, Homer Pasha	Edmonton, Alta	Aug. 30, '85	Feb. 1, '11	A.L.S.
Kimpe, Maurice	Edmonton, Alta	Jan. 17, '76	May 13, '07	A.L.S.
King, William Frederick	Dominion Observatory, Ottawa, Ont.	Feb. 19, '54	Nov. 21, '76	D.T.S. Chief Astronomer, Dept. of the Interior.
Kirk, John Albert	Summerland, B.C.	Jan. 9, '54	May 11, '80	O.L.S., B.C.L.S.
Kitto, Franklin Hugo	Ottawa, Ont	Mar. 28, '80	Mar. 6, '08	Mining Lands and Yukon Br., Dept. of Interior.
Klotz, Otto Julius	Dominion Observatory, Ottawa, Ont.	Mar. 31, '52	Nov. 19, '77	O.L.S., D.T.S., Astronomer, Dept. of Interior.
Knight, Richard H.	Edmonton, Alta	June 7, '77	Feb. 18, '04	A.L.S.
Lamb, Frederick Carlyle	Saskatoon, Sask	Dec. 11, '88	May 17, '12	
Lang, John Leiper	Sault Ste Marie, Ont.	Aug. 18, '84	Oct. 14, '08	O.L.S.
Latimer, Frank Herbert	Penticton, B.C.	May 23, '60	Nov. 13, '85	B.C.L.S.
Laurie, Richard C	Battleford, Sask	Jan. 31, '58	April 27, '83	S.L.S.
Leblanc, Pierre Maxime Henri	Ottawa, Ont	Oct. 1, '84	May 13, '13	
Lee, Roger Melville	Saskatoon, Sask	—— '82	May 11, '11	O.L.S.
Lemoine, Charles Errol	Ville Montcalm, P.Q.		Mar. 31, '82	Q.L.S.
Lighthall, Abram	Vancouver, B.C.	Mar. 30, '78	Dec. 25, '09	
Lindsay, James Herbert	Prince Albert, Sask.	Nov. 27, '82	May 18, '11	S.L.S.
Lonergan, Gerald Joseph	Buckingham, P.Q.	Oct. 8, '71	Feb. 28, '01	Q.L.S., A.L.S., Inspector of Surveys, Dept. of Interior.
Loucks, Roy Wm. Egbert	Saskatoon, Sask.	Oct. 31, '84	Mar. 1, '12	A.L.S., S.L.S.
Lumsden, Hugh David	St. Andrews, N.B.	Sept. 7, '44	April 14, '72	O.L.S.
Macdonald, Colin Stone	Ottawa, Ont	May 26, '87	Mar. 10, '14	
Macdonald, Gordon Alexander	Muirkirk, Ont	May 24, '85	May 17, '12	B.C.L.S.
MacLennan, Alexander L	Toronto, Ont.	May 10, '78	Feb. 23, '05	S.L.S.
MacLeod, George Waters	Edmonton, Alta	—— '88	Mar. 1, '12	A.L.S.
MacPherson, Charles Wilfrid	Dawson, Y.T.	Sept. 6, '71	Mar. 7, '00	O.L.S.
Magrath, Charles Alexander	Ottawa, Ont	April 22, '60	Nov. 16, '81	O.L.S., B.C.L.S., D.T.S., Member International Waterways Commission.
Martindale, Ernest Smith	Kingsmill, Ont	May 26, '86	Mar. 11, '11	
Martyn, Oscar William	Regina, Sask.	Dec. 2, '88	Mar. 11, '11	S.L.S.
Matheson, Hugh	Ottawa, Ont	May 2, '79	May 9, '11	
McArthur, James Joseph	Ottawa, Ont	May 9, '56	April 17, '79	Boundary Surveys, Dept. of Interior.
McCaw, Robert Daniel	Sidney, B.C.	May 24, '83	Mar. 23, '09	O.L.S., B.C.L.S., A.L.S.
McColl, Gilbert Beebe	Winnipeg, Man.	Oct. 8, '82	Mar. 20, '07	M.L.S., D.T.S.
McCall, Samuel Ebenezer	Winnipeg, Man.	July 17, '86	May 18, '11	M.L.S.
McDiarmid, Stuart Stanley	Vancouver, B.C.	Aug. 4, '81	Feb. 23, '05	B.C.L.S.
McDonald, Harold French	Winnipeg, Man.	Nov. 22, '85	Mar. 3, '13	M.L.S., S.L.S., A.L.S.
McElhanney, Thomas Andrew	Vancouver, B.C.	April 21, '86	Mar. 17, '12	
McElhanney, William Gordon	Vancouver, B.C.	Mar. 10, '77	Jan. 7, '11	
McEwen, Duncan Findlay	Edmonton, Alta	Aug. 7, '76	May 18, '11	A.L.S.
McFadden, Moses	Vancouver, B.C.	Aug. 26, '26	April 14, '72	O.L.S., M.L.S.

APPENDIX No. 9—*Continued.*

List of Dominion Land Surveyors who are in possession of Standard Measures.—*Continued.*

Name.	Address.	Date of Birth	Date of Appointment or of Commission.	Remarks.
McFarlane, Walter Graham..	Peace River Crossing, Alta.....	Sept. 28, '75	May 19, '05	A.L.S.
McFarlane, John Baird.....	Toronto, Ont.....	Feb. 25, '79	June 3, '08	A.L.S.
McFee, Angus.....	Red Deer, Alta....	July 14, '46	April 19, '79	A.L.S.
McGeorge, William Graham...	Chatham, Ont	Mar. 22, '87	Mar. 31, '10	O.L.S.
McGrandle, Hugh	Wetaskiwin, Alta...	Mar. 12, '57	Mar. 30, '83	O.L.S., A.L.S.
McKay, Robert B	Vancouver, B.C....	April 21, '83	May 21, '12	
McKnight, James Henry . ..	Simcoe, Ont	July 13, '85	May 13, '13	
McLellan, Roy Alexander.....	Toronto, Ont.	July 31, '89	Mar. 15, '13	
McMaster, William Angus Alexander.....	Prince Albert, Sask.	Feb. 1, '85	July 6, '10	A.L.S., S.L.S.
McMillan, George	Calgary, Alta.....	Dec. 9, '69	Feb. 22, '06	
McNaughton, Alexander L....	Kelowna, B.C	Sept. 30. '81	Feb. 23 '05	O.L.S., B.C.L.S.
McPherson, Archibald John...	Regina, Sask.	—— '70	Feb. 21, '01	S.L.S.
McPhillips, Robert Charles....	Winnipeg, Man. ...	April 24, '56	May 17, '80	M.L.S.
McVittie, Archibald W.	Victoria, B.C.....	May 5, '58	Mar. 30, '82	B.C.L.S.
Meadows, William Walter .. .	Maple Creek, Sask..	May 27, '73	Feb. 23, '05	O.L.S., S.L.S.
Melhuish, Paul	Vancouver, B.C	April 14, '87	May 18, '11	B.C.L.S.
Miles, Charles Falconer.	Toronto, Ont.	Jan. 30, '38	April 14, '72	O.L.S., Inspector of Surveys, Dept. of Interior.
Mitchell, Benjamin Foster....	Edmonton, Alta....	June 16, '80	April 16, '08	A.L.S.
Moberly, Harford Kenneth....	Yorkton, Sask .	—— '69	April 21, '03	S.L.S.
Montgomery, Royal Harp,... .	Prince Albert, Sask.	May 20, '82	Feb. 23, '05	O.L.S., S.L.S.
Moore, Herbert Harrison.....	Calgary, Alta.....	Dec. 1, '69	Feb. 17, '04	A.L.S.
Morrier, Joseph Eldedge. ...	Prince Albert, Sask.	Aug. 29, '74	May 16, '07	S.L.S.
Murray, Ernest William	Regina, Sask.	Mar. 20, '84	May 31, '10	S.L.S.
Narraway, Athos Maxwell.....	Ottawa, Ont..	July 19, '88	May 18, '11	
Neelands, Rupert A..... ...	Hamiota, Man.....	Aug. 26, '84	Mar. 5, '12	
Nelles, Douglas Henry.....	Ottawa, Ont...	Mar. 26, '81	Mar. 9, '07	Geodetic Surveys, Dept. of the Interior.
Nesham, Edward Williams....	Ottawa, Ont.....	June 10, '88	Mar. 15, '13	Geodetic Surveys, Dept. of the Interior.
Neville, Everett A..	Vancouver, B. C....	Jan. 8, '87	May 18, '11	B.C.L.S.
Norrish, William Henry..... .	Ottawa, Ont.....	May 10, '92	May 13, '14	
O'Hara, Walter Francis.....	Ottawa, Ont	Mar. 31, '69	Feb. 19, '95	O.L.S.
Ord, Lewis Redman.....	Hamilton, Ont	Oct. 17, '56	April 1, '82	O.L.S.
Palmer, Philip Ebenezer....	Dorchester, N.B....	May 6, '88	Mar. 7, '12	
Parsons, Johnstone Lindsay R.	Regina, Sask.. . ..	Jan. 18, '76	Feb. 23, '05	O.L.S., S.L.S.
Patrick, Allan Poyntz.....	Calgary, Alta. .	July 18, '49	Nov. 19, '77	B.C.L.S., D.T.S., A.L.S.
Patten, Thaddeus James	Little Current, Ont..	Feb. 4, '59	Mar. 29, '83	O.L.S.
Pearce, William..... ...	Calgary, Alta.....	Feb. 1, '48	May 10, '80	O.L.S., B.C.L.S., A.L.S.
Pearce, Seabury Kains.....	Calgary, Alta.... .	Dec. 6, '87	Mar. 9, '11	A.L.S.
Pearson, Hugh Edward..	Edmonton, Alta ..	Oct. 17, '87	May 17, '12	A.L.S.
Pequegnat, Marcel.....	Berlin, Ont.	April 27, '86	June 6, '10	O.L.S.
Peters, Frederic Hatheway....	Calgary, Alta.....	Nov. 4, '83	Mar. 4, '10	A.L.S., Com. of Irrigation
Phillips, Edward Horace	Saskatoon, Sask.....	Dec. 19, '78	Feb. 21, '02	S.L.S.
Phillips, Harold Geoffrey.....	Regina, Sask.	Sept. 3, '87	April 23, '10	S.L.S.
Pierce, Benjamin Clifford.....	Kingston, Ont . ..	Nov. 5, '90	Mar. 13, '14	
Pierce, John Wesley..... ...	Ottawa, Ont.....	July 14, '85	Dec. 24, '09	O.L.S
Pinder, George Zouch...'.....	Edmonton, Alta	Mar. 5, '81	Mar. 15, '13	
Plunkett, Thomas Hartley	Meaford, Ont.....	June 1, '78	Mar. 12, '08	
Powell, William Henry.	Vancouver, B.C....	Dec. 22, '84	Feb. 22, '11	B.C.L.S.
Proudfoot, Hume Blake	Prince Albert, Sask.	June 23, '58	Mar. 28, '82	O.L.S., S.L.S.
Purser, Ralph Clinton.....	Windsor, Ont.	April 7, '86	Feb. 2, '11	
Rainboth, Edward Joseph.....	Ottawa, Ont	.....	May 19, '81	Q.L.S , O.L.S.
Ransom, John Thomas	Toronto, Ont. . ..	Aug. 24, '88	Jan. 14, '11	O.L.S.
Reilly, William Robinson.....	Regina, Sask.....	Aug. 10, '57	Nov. 17, '81	O.L.S., M.L.S., S.L.S.
Richard, Joseph Francois.....	Ste. Anne de la Pocatière, P.Q.....	....	May 13, '82	Q.L.S.
Rinfret, Claude	Montreal, P.Q	Jan. 5, '86	Mar. 20, '08	Q.L.S.
Rinfret, Raoul	Montreal, P.Q.....	July 16, '56	Feb. 20, '00	Q.L.S.

APPENDIX No. 9—*Continued.*

LIST of Dominion Land Surveyors who are in possession of Standard Measures.—*Continued.*

Name.	Address.	Date of Birth.	Date of Appointment or Commission.	Remarks.
Ritchie, Joseph Frederick	Prince Rupert, B.C.	May 23, '63	Jan. 7, '89	B.C.L.S.
Roberts, Otto Beer	Kingston, Ont	Oct. 19, '87	May 13, '14	
Roberts, Sydney Archibald	Victoria, B.C.	April 10, '48	May 16, '85	B.C.L.S.
Roberts, Vaughan Maurice	Goderich, Ont.	Mar. 22, '64	May 17, '86	
Robertson, Donald Fraser	Ottawa, Ont.	'80	May 25, '09	Dept. of Indian Affairs.
Robertson, Henry H	N. Timiskaming, P.Q	Sept. 13, '47	April 14, '72	Q.L.S.
Robertson, Edgar Doctor	Edmonton, Alta.	Sept. 12, '85	Mar. 15, '13	
Robinson, Ernest Walter P.	Ottawa, Ont.	May 8, '80	May 1, '08	
Robinson, Franklin Joseph	Regina, Sask.	Oct. 20, '76	Feb. 20 '06	S.L.S., Chairman of Board of Highway Commissioners.
Robinson, William Andrew	Winnipeg, Man.	Feb. 21, '81	Oct. 2, '11	S.L.S., M.L.S.
Rolfson, Orville	Walkerville, Ont.	Feb. 26, '85	July 11, '08	
Rombough, Marshall Bedwell	Morden, Man.	Oct. 14, '35	April 14, '72	M.L.S.
Rorke, Louis Valentine	Toronto, Ont.	Feb. — '65	Aug. 13, '91	O.L.S., Inspector of Surveys for Ontario.
Ross, George	Welland, Ont.	June 12, '53	Nov. 21, '82	O.L.S.
Ross, Joseph Edmund	Kamloops, B.C.	Jan. 9, '61	Feb. 12, '91	O.L.S., B.C.L.S.
Routly, Herbert Thomas	Toronto, Ont.	Jan. 20, '78	Feb. 15, '11	O.L.S.
Roy, George Peter	Quebec, P.Q.	Oct. 1, '52	Nov. 17, '81	Q.L.S.
Roy, Joseph George Emile	Quebec, P.Q	Mar. 14, '86	May 25, '10	Q.L.S.
Russell, Alexander Lord	Port Arthur, Ont.		April 14, '72	O.L.S.
Saint Cyr, Jean Baptiste	Montreal, P.Q.	Dec. 17, '66	Feb. 17, '87	Q.L.S.
Saint Cyr, Arthur	Ottawa, Ont.	Nov. — '66	Feb. 17, '87	
Saunders, Bryce Johnston	Edmonton, Alta	Oct. 17, '60	Nov. 16, '84	O.L.S.
Scott, Walter Alexander	Calgary, Alta.	Aug. 8, '85	Mar. 9, '09	A.L.S., S.L.S.
Seager, Edmund	Kenora, Ont.	Nov. 22, '38	April 14, '72	O.L.S.
Segré, Beresford Henry	Davidson, Sask.	Feb. 19, '86	May 8, '12	
Seibert, Frederick V	Edmonton, Alta.	Nov. 5, '85	Mar. 11, '11	O.L.S., S.L.S.
Sewell, Henry DeQuincy	Toronto, Ont.	April 18, '48	May 16, '85	O.L.S.
Seymour, Horace Llewellyn	Ottawa, Ont.	June 11, '82	Feb. 22, '06	O.L.S., A.L.S., S.L.S., T.S Branch Dept. of the Interior.
Shaver, Peter Albert	Calgary, Alta.	Sept. 24, '69	May 18, '14	
Shaw, Charles Æneas	Greenwood, B.C.	Nov. 16, '53	May 10, '80	O.L.S., B.C.L.S.
Shepley, Joseph Drummond	N. Battleford, Sask.	Sept. 13, '79	Mar. 12, '06	S.L.S.
Smith, Charles Campbell	Vancouver, B.C.	Jan. 1, '73	Feb. 22, '06	O.L.S.
Smith, Donald Alpine	Regina, Sask.	Sept. 22, '80	April 21, '10	S.L.S.
Smith, James Herbert	Edmonton, Alta.	Nov. 9, '76	Feb. 23, '05	A.L.S., O.L.S.
Soars, Henry Martin Robinson	Edmonton, Alta.	April 22, '77	Nov. 2, '08	A.L.S.
Speight, Thomas Bailey	Toronto, Ont.	Feb. 8, '59	Nov. 16, '82	O.L.S.
Starkey, Samuel M	Codys, N.B.	Sept. 4, '37	April 14, '72	P.L.S. for N.B.
Steele, Ira John	Ottawa, Ont.	April 6, '81	April 16, '08	O.L.S., S.L.S.
Stewart, Elihu	Collingwood, Ont.	Nov. 17, '44	April 14, '72	O.L.S.
Stewart, Lionel Douglas N	Fort Frances, Ont	Sept. 15, '83	Jan. 27, '10	O.L.S.
Stewart, Will Malcolm	Saskatoon, Sask.	Nov. 26, '84	June 6, '07	S.L.S.
Stewart, Louis Beaufort	Toronto, Ont.	Jan. 27, '61	Nov. 22, '82	O.L.S., D.T.S. Professor of Surveying and Geodesy, University, of Toronto.
Stewart, Alexander George	Edmonton, Alta.	Aug. 16, '87	Mar. 14, '10	A.L.S.
Stewart, Alexander Stanley	Lacombe, Alta.		June 13, '08	
Stewart, George Alexander			April 14, '72	O.L.S.
Stewart, Norman C	Vancouver, B.C.	Jan. 9, '85	Mar. 7, '12	B.C.L.S.
Stock, James Joseph	Ottawa, Ont.	Aug. 16, '87	Mar. 2, '10	
Street, Paul Bishop	Toronto, Ont.	Dec. 3, '81	Mar. 29, '10	
Stuart, Alexander Graham	Buckingham, P.Q.	July 16, '88	May 9, '11	
Summers, Gordon Foster	Haileybury, Ont.		Oct. 20, '10	O.L.S.
Swannell, Frank Cyril	Victoria, B.C.		May 10, '04	B.C.L.S.
Taggart, Charles Henry	Kamloops, B.C.	,83	May 9, '11	

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APPENDIX No. 9—*Concluded.*

LIST of Dominion Land Surveyors who are in possession of Standard Measures.—*Concluded.*

Name.	Address.	Date of Birth.	Date of Appointment or of Commission.	Remarks.
Talbot, Albert Charles	Calgary, Alta	April 5, '56	May 13, '80	A.L.S., Surveyor Land Titles Office.
Taylor, Alexander	Portage la Prairie, M	Aug. 6, '75	June 9, '04	M.L.S., S.L.S.
Taylor, William Emerson	Toronto, Ont.	Aug. 3, '81	Dec. 16, '10	O.L.S.
Teasdale, Charles Montgomery	Moosejaw, Sask.	Oct. 18, '79	Mar. 9, '06	S.L.S.
Thompson, William Thomas	Grenfell, Sask	Nov. 1, '53	Nov. 19, '77	D.T.S., S.L.S.
Tipper, George Adrian	Brantford, Ont.	July 25, '86	May 18, '11	A.L.S.
Townsend, David Thomas	Calgary, Alta.	.....	Mar. 23, '07	O.L.S.
Tracy, Thomas Henry	Vancouver, B.C	June 25, '48	April 14, '72	O.L.S., B.C.L.S.
Tremblay, Ifred Joseph	Montmagny, P.Q.	.....	Feb. 18, '90	
Tremblay, Albert Jacques	Edmonton, Alta.	July 25, '87	Mar. 1, '12	A.L.S.
Turnbull, Thomas	Winnipeg, Man.	May 26, '57	Mar. 29, '82	O.L.S.
Tyrrell, James William	Hamilton, Ont.	May 10, '63	Feb. 16, '87	O.L.S.
Underwood, Joseph Edwin	Saskatoon, Sask	Nov. 3, '82	May 18, '11	S.L.S.
Van Skiver, Leighton A.	Fish Lake, Ont	..... '74	May 13, '13	
Vanghan, Josephus Wyatt	Vancouver, B.C	Oct. 17, '45	June 11, '78	B.C.L.S.
Vicars, John Richard Odlum	Kamloops, B.C.	April 16, '55	May 17, '86	O.L.S., B.C.L.S.
Vickers, Thomas Newell	N. Battleford, Sask.	April 19, '90	May 17, '12	S.L.S.
Von Edeskuty, Joseph Otto	Vancouver, B.C	Oct. 27, '84	Mar. 3, '13	
Waddell, William Henry	Edmonton, Alta.	Mar. 23, '83	Mar. 25, '07	O.L.S., A.L.S.
Waldron, John	Moosejaw, Sask.	Aug. 1, '72	April 2, '07	S.L.S.
Walker, Claude Melville	Guelph, Ont.	Oct. 16, '84	Mar. 11, '11	
Wallace, James Nevin	Calgary, Alta.	Aug. 21, '70	Feb. 20, '00	O.L.S , A.L.S.
Warren, James	Walkerton, Ont.	Nov. 7, '37	April 14, '72	O.L.S.
Warrington, George Albert	Winnipeg, Man	..... '83	Mar. 15, '13	M.L.S.
Watt, George Herbert	Ottawa, Ont.	Feb. 5, '76	Feb. 24, '02	T.S. Branch Dept. of Interior.
Waugh, Bruce Wallace	Ottawa, Ont.	Mar. 24, '88	May 28, '12	
Weekes, Abel Seneca	Edmonton, Alta	Feb. 17, '66	Feb. 11, '92	A.L.S., S.L.S., O.L.S.
Weekes, Melville Bell	Regina, Sask.	Nov. 28, '74	Feb. 18, '03	O.L.S., S.L.S.
Wheeler, Arthur Oliver	Sidney, B.C.	May 1, '60	Nov. 21, '82	O.L.S., B.C.L.S. M.L.S., A.L.S.
White-Fraser, George W.R.M.	Victoria, B.C.	..... '61	Feb. 21, '88	D.T.S., B.C.L.S.
Wiggins, Thomas Henry	Saskatoon, Sask	Aug. 24, '63	Feb. 18, '96	O.L.S., S.L.S.
Wilkins, Frederick W. B.	Norwood, Ont	June 27, '54	May 18, '81	O.L.S., D.T.S.
Wilkinson, William Downing	Hamilton, Bermuda.	Mar. 22, '64	Feb. 22, '93	
Williams, Guy Lorne	Enderby, B.C	Mar. 3, '79	June 24, '08	B.C.L.S.
Wilson, Reginald Palliser	Winnipeg, Man.	July 9, '72	Jan. 26, '11	M.L.S.
Woods, Joseph Edward	Pincher Creek, Alta.	Oct. 13, '61	Nov. 14, '85	A.L.S.
Wrong, Frederick Hay	Windsor, Ont.	Aug. 22, '86	May 18, '11	
Young, Stewart	Regina, Sask.	Sept. 2, '84	May 17, '13	S.L.S.
Young, Walter Beatty	Winnipeg, Man.	July 6, '80	Mar. 25, '05	M.L.S.
Young, William Howard	Calgary, Alta.	June 8, '78	May 17, '07	A.L.S. District Engineer.

PART V.

DOMINION PARKS

DOMINION PARKS.

REPORT OF THE COMMISSIONER OF DOMINION PARKS.

OTTAWA, June 30, 1915.

W. W. CORY, Esq., C.M.G.,
Deputy Minister of the Interior.

SIR,—I beg to submit my fourth annual report of the Dominion Parks Branch of the Department of the Interior.

The year 1914-15 was a year of active development. The details of the work carried on are covered by the reports—attached hereto—of the Chief Superintendent of Dominion Parks and of the superintendents of the individual parks. As on previous occasions I shall devote my attention to a statement of the aims and ideals on which the national parks are being developed.

I have each year emphasized the fact that national parks are not national ornaments, but are essentially service parks; that they exist to render real, necessary, and valuable service to the people of Canada.

The unparalleled conditions which the war has brought about, the extraordinary conditions which will prevail when the war is over, accentuate the necessity of still greater activity along the lines on which parks development has been taking place. There are two general lines on which parks directly and effectively operate to the advantage of the Dominion. One is purely commercial—it relates to the money which the parks by their extraordinary attractions bring into the Dominion through tourist trade. The other is humanitarian, it relates to what the parks do for the people of Canada by providing for them facilities for recreation (and proper recreation is a most important factor in the matter of moral, mental, and physical efficiency) and the encouragement they give to all Canadians to develop habits of sane recreation.

COMMERCIAL POSSIBILITIES.

No feature of the war conditions has been more apparent than the commercial depression which has been one of its accompaniments. It has driven home the necessity of Canada's making the most efficient and intelligent use of all her natural resources. The sublime grandeur of Canada's national parks constitutes a very important commercial asset, because of the tourist traffic which it attracts. From year to year I have submitted figures to show the almost unbelievable sums that are annually spent by the world's tourists. A calculation based on the number of tourists attracted to Canada's most important park, that at Banff, during the past five years, indicates very clearly how valuable parks are to the Dominion from the commercial standpoint:—

VISITORS AT BANFF.

Season.	Canadian.	Foreign.	Total.
1910–11	26,274	37,220	63,494
1911–12	30,000	43,725	73,725
1912–13	45,709	30,173	75,882
1913–14	36,144	24,681	60,825
1914–15	32,881	15,016	47,897
	171,008	150,815	321,823

The foreign tourist will in most cases spend about $100 in transportation alone and, in addition, spend large sums on hotels, liveries, souvenirs, etc. But taking $100 as the average expenditure of each foreign tourist, which is a very low estimate, then during the five years in question foreign tourists who visited Rocky Mountains Park spent in Canada the sum of $15,081,500.

Now, as to Canadians: during the five years in question the total Canadian visitors were 171,008. If each spent on an average only $50—and this, too, is a very low estimate because large numbers of the Canadian tourists come from Eastern Canada and therefore pay high transportation charges—then we find that this park resulted in keeping at home $8,550,400.

Large as these figures are, they represent but a small part of what Canada may derive in future years in actual dollars and cents from its national parks if they are adequately developed to attract tourist traffic. This traffic is fraught with the greatest of potentialities from the purely business standpoint. It is unique in this regard that while it brings in large sums of money it means that the country does not give in return anything which represents a loss to the country. When wheat is sold we sell a portion of the fertility of our soil. But the tourist who pays his money to see our mountains and lakes and falls, our canyons and glaciers, not only leaves his money but also leaves whole and unimpaired all those natural attractions which brought him here. These beauties remain forever to attract more tourists and more tourists' dollars.

There are hundreds of points in Canada not included in parks, which possess outstanding attractions for tourists. There is almost no limit to the amount of tourist business which can be secured, but it will not come to Canada unless it is sought. If Banff alone in five years can attract an aggregate business of approximately twenty-four millions, it seems obvious that there should be an organization developed—either as a part of the parks organization or independent of it—which will actively seek to attract tourist traffic to Canada.

A TOURIST BUREAU.

Up to the present, efforts to attract tourist traffic have been left to the transportation companies. The country does not leave its immigration propaganda in the hands of the transportation companies, though they are direct beneficiaries from immigration.

Canada's "out-of-doors" both within and without the national parks, is a huge source of potential revenue. A tourist bureau, equipped to deal intelligently with the development of this great national asset appears justified, appears to be demanded in the best interests of Canada and its people. The Parks Branch, as the only federal organization having any direct concern in matters closely related to the development of tourist traffic, has given a good deal of consideration to the question of a

tourist bureau. Many suggestions as to organization and policy in that regard have been developed. Several points stand out in this connection. Foreign tourists will not come to Canada unless they are made familiar with the attractions Canada has to offer them. Publicity by interested transportation companies can never be sufficiently effective or adequate because the public is apt to discount any literature issued by them, and any representations made by them, on the ground that they are primarily concerned in selling transportation and so are primarily seeking to secure the tourists' money by any means. The tourist, moreover, wants to know not only that there are worth-while attractions for him, but that when he arrives he will be assured of conveniences, comfort and safety. It is obvious that in regard to all these points, a federal Tourist Bureau alone can adequately and satisfactorily meet the situation. Personally I am convinced that an efficient organization can be developed at comparatively little cost, and that through it a huge revenue can be secured for the people of Canada, which will contribute materially towards meeting the extraordinary expenditures the country has to meet in connection with the war.

THE HUMAN SIDE.

If war conditions make it desirable for Canada to proceed with an active development of its potential commercial resources, they also, perhaps to an even greater extent, demand renewed activity with respect to that other aspect of parks work—the humanitarian.

Any country's greatest asset is its human units. It matters not what Canada's resources of soil, and forests, and mines, and waters may be, its position in the world, the condition of its people, will depend on the efficiency of its human units. As explained in previous reports, Dominion Parks work, as it really is, stands for those things which are essential to human efficiency—for those things which promote physical, mental, and moral welfare.

As a result of the war, Canada is losing thousands of her most efficient human units. As a result of the war, thousands of her soldiers who return will be maimed or incapacitated. As a result of the war, industrial and economic conditions in Canada will present many new and complicated problems requiring an efficient population to solve. Canada therefore more than ever requires those things which promote human efficiency.

In previous reports I have pointed out in detail the many conditions—unsanitary habits of life, overheated rooms, lack of fresh air, poorly arranged factories and workshops, exclusion of sunlight, foul air, drudgery, monotony, lack of play, and similar hurtful conditions—which are constantly sapping the efficiency of the people. I also pointed out that while many agencies must work to eliminate these adverse conditions, the ideal behind national parks—ample facilities for all Canadians to enjoy recreation in the out-of-doors—if realized, would offer a powerful antidote to these conditions, a means of largely minimizing their corrosive influence. To avoid repeating in detail how parks can and do effectively serve this purpose, attention is called to a few familiar instances of what life in the out-of-doors under proper conditions does for the human being. Every one in Canada has seen for himself the transformation that has been brought about in our troops—the bright eyes, the decisive step, the healthy glow—after a few weeks of "setting-up" in a military camp. For centuries, tuberculosis was an all-powerful and ever-victorious enemy of the human race until a few years ago, when it was discovered that nature —life in the open air close to nature—was an effective remedy, and now the "white plague" is fast disappearing. National parks exist for the purpose of providing for all the people of Canada facilities for acquiring that virile and efficient manhood so noticeable in Canadian military training camps.

During 1914-15, large extensions were made in the areas of the parks. Attention is called to the aims and ideals behind parks to emphasize the necessity of still further extensions, extensions to continue until every citizen of Canada, no matter where he may live, will be within easy access of a park where he can enjoy, by right of citizenship, those facilities for recreation in the open air which are necessary for his well-being, and where he will develop habits which will dominate his life after he has left the parks.

For the value of parks to Canada's people consists perhaps fully as much in their influence in the development of proper habits of recreation in the out-of-doors as it does in the effect on the individual of an outing in a park. It has been well said "Habit is the supreme law of human nature. It is our supreme strength—or our greatest weakness." A habit of recreation in the open air, close to nature, means so much to an individual's efficiency and welfare that is vital that it be encouraged and developed.

PRESERVATION OF WILD LIFE.

During the year considerable work was also done by the branch in connection with the preservation of wild animals and migratory birds—a natural division of parks' work. National parks exist to preserve not only as much as possible of the natural scenic beauty of the country, but also the fauna and flora and other wild life, for the pleasure and benefit of the generations that are to come. In future years the parks should be the natural history schools of Canada, and ultimately, as civilization encroaches more and more upon the wilderness, the parks will probably be the only places where the native fauna and flora will be found in a natural state.

A couple of years ago Prof. W. T. Hornaday, Director of the New York Zoological Park, startled North America by his book "Our Vanishing Wild Life" in which he clearly showed that America is rapidly becoming a gameless continent, and that unless drastic action is taken at once, practically all wild life will follow the carrier pigeon, the great auk, and the bison, to extinction.

A number of the native birds and animals of Canada are forever extinct. The buffalo was saved at the last moment by the Canadian Government's purchase of the Pablo herd in Montana and the establishment of Buffalo park. If this action had not been taken, the buffalo, the finest wild animal native to Canada, would have been a thing of history only to succeeding generations. The buffalo are now, however, increasing rapidly in the great reserve set apart for them, and it seems probable that Canadians for all time to come will be able to visit the park and enjoy the pleasure of seeing these animals living in a natural state.

While the case of the antelope is not yet so desperate as that of the buffalo, it is fast approaching it. Without protection, there seems no doubt that this graceful animal will be extinct within a very few years. Since the facts were realized, the Parks Branch has been taking steps to prevent the extinction of the antelope. The experiment was first tried of capturing a number and placing them in Buffalo park, but either because the natural food was not what was required, or because they suffered from the shock of capture, the animals did not thrive, and almost all of them died within a few months. Several attempts have been made but have met with little success. During the past year it was decided to try building a reserve about them by inclosing a few square miles in a locality in which a band was found to be living, thus ensuring natural conditions of food, etc., and avoiding the necessity for capture, which seems to have a very injurious effect upon these exceedingly timid animals. It is hoped that in this way better results may be secured.

While the deer, moose, elk, and caribou have not suffered so severely as the buffalo and antelope, Prof. Hornaday shows conclusively that many species are in need of greater protection. The mule deer, one of the finest animals known to sportsmen, has,

he asserts, already been four-fifths exterminated; the barren-land caribou, in spite of the enormous numbers still living, will, he predicts, be swept away in 100 years or less; while the moose, except where protected, will surely and rapidly disappear. These conditions emphasize the need of active steps being now taken. Protective laws, while of very great importance, must be supplemented by ample sanctuaries. All Dominion parks are wild-life sanctuaries, and everything done in connection with the extension of parks from the purely humane standpoint previously referred to, will at the same time contribute in a most important and effective way towards the preservation of Canadian wild life.

In this connection, perhaps it is not out of place to call attention to what the preservation of wild life in the national park at Banff has brought about. A few years of rigid protection has resulted in a very great increase in the wild life of the parks. To-day thousands of tourists make special trips to see the large herds of mountain goat, sheep, and other animals that are to be found roaming there in a wild state. These animals have become an attraction to the tourist that is perhaps not even second to the grandeur of the mountain scenery. The protection of wild life in this park adds enormously to its recreational value, and from the purely commercial standpoint it pays because it is to-day attracting and will continue to attract in succeeding years the dollars of the tourist. People love to look at wild animals. The crowds that constantly surround cages in zoos show this, but the attraction of animals in their wild state is immeasurably greater.

The extension of Jasper and Waterton Lakes parks, which took place during the year, will largely contribute towards the preservation of wild life in the Rockies. Jasper park was enlarged from 1,000 to 4,400 square miles, and extended to the south so as to take in the great Brazeau country, which, in addition to possessing striking scenic beauty is among the best big-game districts in the Rockies. Reports from many sources showed that this big game was suffering severely from the inroads of Indians and others, and the most feasible means of protecting it appeared to be by extending the park boundaries as described.

On the borders of Waterton Lakes park there was, similarly, a district famous for Rocky Mountain sheep and goat. The original area of the park, 13·50 square miles, was so small that it afforded practically no protection to the wild sheep and goats of this region. As a result of strong representations from the Camp-Fire Club of America, and other parties interested in the preservation of wild life, it was decided to extend the boundaries of the park to the south as far as the international boundary so as to make it adjoin the United States Glacier national park, thus practically establishing an international game reservation, and to the north as far as the west branch of the Southfork river, covering 423 square miles in all.

FUR-BEARING ANIMALS.

The increased protection of fur-bearing animals appears to be dictated by every principle of wisdom and economy. Our fur-bearing animals were once the source of immense wealth to Canada, but we have been extremely wasteful with this as with other resources, and have made enormous inroads on our original capital. The value of preserves in restoring the original wealth of wild life is shown by the success which has attended the preservation of beaver in Algonquin park. What has been done there for the beaver can be done for all other wild fur-bearing animals by the creation of reserves in those districts which are known to be their natural habitat. The Parks Branch has during the past year been making investigations with a view to definitely deciding what districts are best adapted for such reserves.

BIRD PROTECTION.

There is, in addition, great need for sanctuaries for our wild fowl—for the wild geese, duck, plover, etc., of the inland, and for the gulls, terns, and gannets

of our sea-coasts. In the United States, sanctuaries are also being established for song-birds, with most encouraging results. There is no doubt that these reserves are doing much to repair the waste of bird-life which is proving so costly to agriculture, through the consequent increase in insect life. The creation of song-bird sanctuaries in Canada in those parts of the country which suffer most from the depredations of insects might well be considered at the present time.

Active co-operation for the preservation of migratory bird life between the United States and Canada also appears to be essential. Restrictions in the two countries must be complementary. It is useless for Canada to have stringent laws which will protect bird life in its breeding grounds in the Dominion if wholesale slaughter is allowed in the States where the birds go for the winter season. And, of course, it is useless for the United States to enforce rigid protective laws if Canada does not protect the bird life when it migrates north. The United States has proposed a treaty to meet these conditions, and all the provincial authorities in Canada, specially concerned in wild life, have cordially approved the principle of such a treaty.

I have already called attention to the conditions arising out of the war, and the necessity they emphasize of making a survey of Canada's needs and of the resources with which to meet these needs. Canada's wild life is just as much one of her natural resources as her forests, her minerals, or her soil. Sentimental and æsthetic reasons demand the preservation of wild life but, in addition, there are many other important conditions which accentuate this demand. The preservation of bird life is necessary for the protection of Canada's crops. It is estimated to-day that Canadian producers annually lose $80,000,000 from insect destruction in consequence of the lack of birds to combat the insect army of destruction. Our forests also require the birds to protect them from their insect enemies. Huge areas of Canada's hinterland are immensely valuable as a source of revenue from furs. This industry demands action on lines which will ensure a perpetuation of the supply.

Game birds and the ordinary game animals such as deer and moose are of value as a food supply, but even more so through what they mean in the matter of recreation for the hardworking farmer and the desk-worn city man. There are few things that lure so many people to play and the out-of-doors as wild life. Modern industrial and economic conditions have been doing much to undermine the vitality and efficiency of the human race. One of the important requirements for the welfare of the people to-day is the development of those things which will lure them to some recreation in the out-of-doors in order that bad social conditions may be counteracted and overcome. National parks exist for this purpose, and in this work the parks have no stronger ally than wild life, which seems to call man to the out-of-doors by an appeal to the old primeval instinct of man as he originally was, a hunter and an out-door animal.

Respectfully submitted.

J. B. HARKIN,

Commissioner of Dominion Parks.

APPENDIX No. 1.

REPORT OF CHIEF SUPERINTENDENT OF DOMINION PARKS.

EDMONTON, April 1, 1915.

SIR,—I have the honour to submit herewith my third annual report as Chief Superintendent of Dominion Parks, for the fiscal year ending March 31, 1915, together with reports of the superintendents of the different parks, which are tabulated below in the same order as on previous occasions:—

(1) Report of Chief Superintendent of Dominion Parks.
(2) Report of Superintendent of Rocky Mountains Park.
  (a) Report of the Curator of Banff Museum.
  (b) Analysis of Nationalities of Visitors to the Hotels.
  (c) Report of the Alpine Club.
  (d) Report of Timber and Grazing Inspector.
(3) Report of Superintendent of Yoho and Glacier Parks.
(4) Report of Superintendent of Buffalo Park.
(5) Report of Superintendent of Elk Island Park.
(6) Report of Superintendent of Waterton Lakes Park.
(7) Report of Superintendent of Jasper Park.
(8) Report of Acting Superintendent of Revelstoke Park.

The above reports give in general outline the work accomplished in each park during the fiscal year just closing. The extraordinary conditions which arose during the months of July and August necessitated considerable and immediate curtailment in the programme of improvements which had been planned. The work which it was permitted to carry on was completed in a very satisfactory manner, but as the different undertakings are dealt with fully by the superintendents, it will be unnecessary for me to go into details.

In Rocky Mountains park one of the most important accomplishments was the completion of the new bathhouse. The building is of very pleasing design, built upon the side of Sulphur mountain between the Cave and Hot Springs basin, and adds greatly to the charm of the landscape, in addition to supplying a long-felt want in the way of additional bathing accommodation. In the past, many tourists who desired to patronize the baths have been unable to do so owing to the limited number which could be accommodated at one time. The new bathing establishment is everything that could be desired, thoroughly up-to-date and convenient, and when the season opens next June, I expect the bath will be taxed to its limit during the greater part of the season.

The present building is only half of the plan as projected by the architect; when the other half is undertaken and the grounds below the terrace drained and artistically laid out in conformity with the general rearrangement plans, Banff will certainly be the "Gem of the Rockies."

Considerable improvement in the type of dwelling house is noted in Banff, although the general depression prevailing everywhere prevented the erection of a number of projected buildings.

Several fires occurred in the business portion of the town, resulting in partial destruction of the property, but thanks to the vigilance, organization, and hard work of the local volunteer fire brigade, assisted by the citizens, the damage was chiefly

confined to the building in which the fire originated. The fire apparatus is the property of the department and has been considerably improved and added to since last year. The fire hall has been fitted up and offices provided for the resident engineer and police commissioner. The telephone exchange is to be removed from the present quarters in the Administration building to its new offices in the same building as the fire hall, and the service will be improved and brought up-to-date in every respect.

The sewer and water service is in first-class order, and is being gradually extended to meet the requirements of the increased number of new residences which have been erected during the year. A new 20-inch steel water main has been partially installed and, when completed, will give the town of Banff an excellent water service.

The automobile road from the east boundary of the park to Banff has been considerably improved and now affords motorists from the prairie cities an excellent opportunity to drive through the National park and enjoy the magnificent scenery en route.

This road is being extended and is about completed to Castle, some 17 miles west of Banff. About a mile west of Castle the road crosses the tracks of the Canadian Pacific railway, a short distance farther on it crosses the Bow river over a two-span steel bridge, then winds its way upwards in a series of easy gradients to the summit of the Continental Divide; thence on through the Vermilion pass into the province of British Columbia. This section of the road remains to be completed.

The weather conditions during the season were not of the best; this, coupled with the general financial stringency and great European war, tended considerably to restrict travel and resulted in a marked decrease in the number of visitors registering at the various hotels in the National parks.

Considerable attention has been given to afford visitors and residents every facility for healthy outdoor enjoyment. Additional trails have been opened up, roads have been improved, a recreation ground has been laid out for baseball, cricket and football and other sports. The children's playground has been specially fitted up for their enjoyment, and a commodious building equipped with large kitchen, cloak rooms, and all the necessary conveniences has been provided.

The Bow river is navigable for motor launches for a distance of some 10 miles from Banff and, with the Echo river, Vermilion lakes, and Fortymile creek, affords delightful opportunities for boating and canoeing amid the unrivalled scenery of the mountains.

The outlying lakes and streams, which are fairly well stocked with trout of all sizes, can be reached by pony trail. A fish hatchery has been established to restock the various depleted streams and lakes, and the followers of Isaac Walton will find even better sport in the near future. Taking all these attractions into consideration, not to mention mountaineering, the Rocky Mountains park stands in a class of its own, excelled by no other.

YOHO AND GLACIER PARKS.

These parks were formerly under the superintendence of Mr. Maunder, who was sent to take temporary charge of Revelstoke park. Captain Russell was appointed in his place, and commenced his duties on September 8.

The usual repairs to the townsite were made during the year, and a new sidewalk was provided to accommodate the residents. The Emerald Lake road was kept in excellent repair by two section men, located in cabins 2 miles apart, which were built for their accommodation. This system of road repair work has given good satisfaction. I am pleased to note that the whole length of the road from Field to Emerald lake is in perfect condition except for a short distance about half a mile west from Field, where the Kicking Horse river has changed its course— an annual occurrence— undermining the cribwork and carrying away the lighter material, but not encroaching upon the road. This will be replaced during the coming season. The road to the

Yoho has been very much improved. Two cabins for section men were built, and the first 4 miles have been looked after by these men and kept in excellent order. The Emerald Lake road and this portion of the Yoho road is much frequented by pedestrian tourists, and they have more than once praised the condition of the roads.

Bridges were repaired, approaches to them graded up, the big grade at mile 4½ was abandoned and a new roadway selected and built following the right bank of the Kicking Horse river on a gradually rising grade, the maximum being 10 per cent in the last hundred feet. The new road is shorter by some three hundred feet, and decidedly better than the old one.

The road farther on has been widened to 16 feet, and at the junction of the Yoho and Kicking Horse rivers considerable improvement has been made by throwing the road some 10 feet back on solid ground, blowing up some dangerous overhanging rocks and making an easy turn in place of the sharp short bend.

Repairs on the Switchback are an annual affair, and I should like to see this portion of the road changed and placed on solid footing with an easier grade than at present. The widening of the road along the canyon was not completed owing to the crew having to abandon all work and proceed to fight the fire at Wapta, which at one time threatened to assume alarming proportions.

The Alpine Club of Canada held its ninth annual camp at the head of the Upper Yoho valley during part of the months of July and August. All trails leading to the camp were previously cleared out and put in order. It was found that the waters of lake Duchesnay which were abnormally high had flooded out the trail and rendered it impassable. A new trail was accordingly built on higher ground, and everything was done to enable the members of the Alpine Club to enjoy the magnifieent scenery. A visit was paid to their camp, where we were most hospitably entertained and a most enjoyable evening spent round their camp fire. I cannot let this occasion pass without remarking that I never saw a larger or more enthusiastic assemblage, gathered as they were from all quarters of the universe, for the sole purpose of climbing the dizzy heights surrounding their camp, and enjoying the magnificent panorama of the Yoho—a view superior to none in our national parks.

GLACIER PARK.

The usual annual clearing of the trails in and around the great glacier was undertaken by a small force of men, and successfully completed. The continuation of the road to the Nakimu caves was carried forward and completed to a point about a mile from the caves. From this point a good trail is available for the balance of the distance.

The Nakimu caves are an attraction by themselves, and when the road is finished and can be used for carriage traffic, the trip will be the most interesting in the Glacier park.

The Canadian Pacific railway grade revision tunnel through mount Macdonald is making good progress, and will probably be completed some time before the end of next year.

BUFFALO PARK.

The farming operations carried on in Buffalo park during the past season were highly successful. Three hundred acres were put under crop, 210 of which were cut for grain and produced over 14,000 bushels of feed oats. Ninety-one acres of green food were cut, and an additional 300 acres broken for next season's crop.

Some 4,000 bushels of grain were shipped to other parks, where they were delivered and stored at a cost considerably less than the market quotation.

A necessary addition was made to the superintendent's residence, at small cost, which will serve as an office and fill a long-felt want. Other small improvements were made to place Buffalo park on a good footing to successfully carry on the work.

Experimental reinforced concrete fence posts were made but not erected owing to other pressing and more important work. If we can secure concrete fence posts at the price given by the superintendent in his report, viz.: three dollars or less, I am of the opinion that it will be good policy to make a contract to re-fence Buffalo park with such posts suited to the requirements of the park.

The question of subdividing the herd of buffalo is growing more pressing each year: in fact, I consider it an absolute necessity for the preservation of the finest type of bison. The animals are now practically in one large herd, with no means of separating and treating them in the event of contagious disease showing itself.

The herd has added to its number and decreased by six from various causes. The total is a very gratifying showing. Many fights have occurred among the herd for supremacy, and many have been lamed; this again tends to show the absolute necessity for separating them, and administering the herd on a similar plan to that of an ordinary stock ranch.

The elk, moose, and mule deer are doing exceptionally well. We were obliged to remove the most of the moose from the home paddock, and turn them into the large park, owing to the browse becoming scarce and needing a rest for re-growth. The antelope do not thrive, which is to be regretted; they now number three, and as there is an area set apart for the preservation of the antelope, I do not think we should make further attempts to raise them in Buffalo park.

ELK ISLAND PARK.

The improvements contemplated and partially carried out are enumerated in the superintendent's report. As more is done in the opening up of roads to give access to that portion of the lake shore, known locally as Sandy Beach, this park will doubtless become an attractive summer resort.

Unfortunately all the work contemplated for this season was not completed, owing to the unusually wet weather in the early part of the year and, later on, the necessity of curtailing expenses on account of the outbreak of war.

Owing to the rank growth of weeds on the new ploughed land, considerable work had to be done to place the main fireguard in first-class order.

The east fence, some four miles in length, was re-posted with posts of tamarack treated with antiseptine with a view to testing the preservative qualities of the latter. During the coming year it will be necessary to renew the other three sides.

A new departure was made in the matter of securing the annual supply of hay for the buffalo herd. Usually it has been put up by contract; this year machinery was purchased and the force of men working in the park was employed to put it up, so that some 200 tons were secured at a lower figure than the usual contract prices.

The park is well patronized by visitors from all parts, and no doubt if greater boating and canoeing facilities were provided on the lake, it would add materially to the attractions of the place.

The buffalo, elk, moose, and deer are in fine condition. The buffalo have added sixteen to their number; one old bull was killed to save the head and robe, making some ninety-seven in the herd. The moose and elk in this park are exceptionally fine animals, and if we had facilities for trapping some of them it would be a move in the right direction to do so and ship the males to improve the herds in the other parks. As the buffalo and other animals are increasing, I would strongly urge the extension of the boundaries of the park in a southerly direction. The lands to the south are not so heavily timbered and would make excellent pasture land for all the

animals now in the park and, in addition, a considerable number of elk and deer which are known to range in the area to the south and frequently come up to the present park boundary could be secured.

WATERTON LAKES PARK.

The improvements in this park were chiefly repairs to roads in the immediate vicinity of that portion of the area adjacent to the middle and upper Waterton lakes. The boulevard facing the bay at the south end of the upper lake was also cleared of the heavy and dense undergrowth, and made accessible.

The area of the park was enlarged during the summer from 13·5 to 423 square miles. Up to that time it had been under the care of Forest Ranger John George Brown, more popularly known as "Kootenai Brown," one of the oldest of old timers, and a typical frontiersman. In view of the greatly increased area to be administered it was decided to appoint a superintendent, and Mr. Robert Cooper was appointed to this office in September, with headquarters at Waterton Mills. Temporary buildings were improved to accommodate the administrative staff.

A chief fire and game warden, Mr. G. Allison, and three additional wardens were appointed to enforce the fire and game regulations. Later, owing to the short notice given of the enlargement of the park and the inclusion therein of the area formerly open to hunters and trappers, it was found necessary, for the proper preservation of the game to increase the number of wardens by the appointment of three additional men to the temporary staff. Owing to their vigilance and untiring zeal, combined with considerable tact, the chief game warden and his assistants had to prosecute in two cases only. Shortly after the close of the hunting season, the services of the temporary wardens were dispensed with.

A wing of the new hotel, which is being erected by Mr. J. Hazzard, was completed and opened to the public, thus supplying a long-felt want. Other buildings and improvements are contemplated; but development is necessarily slow, owing to the cost of hauling building material from the nearest railway—a distance of some 40 miles.

Excellent fishing can be had in the numerous lakes and streams that abound throughout the park.

Considerable work will be necessary in the matter of roads and trails to properly develop the park and make the numerous scenic points accessible to the tourist. A main road should be built from the north to the south and made available for motor and general traffic, and a junction formed with existing roads leading across the provincial boundary into British Columbia, also across the international boundary to the United States Glacier National park.

JASPER PARK.

During this year the boundaries of Jasper park were extended from 1,000 to 4,400 square miles. The area added abounds in game of all kinds.

The patrol of this vast area will necessitate the augmentation of the present force of fire and game wardens; also the re-allocation of the territory of the present wardens, in order to patrol it economically. Numerous new trails will require to be projected and built, and should be so planned that they can eventually and gradually be cheaply widened to form a net work of roadways for rapid intercommunication, suitable for motor traffic.

On alighting from the Grand Trunk Pacific train at Jasper, the tourist is at once struck by the picturesque Administration building which stands out conspicuously immediately north and at a short distance from the station. Considerable improvement is also noticeable in the business and residential portion of the town.

Excavations for the foundation of the palatial hotel to be constructed by Mr. Weiss, of Minneapolis, were commenced, but owing to the financial stringency, further work has been abandoned.

The grading of the avenues and streets has been partially completed. Considerable difficulty was met with, owing to the large number of enormous boulders and rocks which are thickly strewn all over the townsite. This made necessary a large amount of blasting and special appliances for the economical carrying out of the work.

The main road to the Athabaska crossing was finished, and a pile bridge was constructed over the river. This bridge was much damaged during high water, and temporarily repaired, but it has been further improved and it is hoped will stand until a permanent steel bridge is erected at the site selected, a short distance above the present structure.

The road from here to Maligne canyon is partially completed, and a commodious shelter, consisting of three rooms (two sleeping, and one living, with stove in latter) for the accommodation of the tourist has been built. Various trails have been constructed with a view to intercommunication in case of forest fires, also to enable the tourist to visit the various scenic points of interest in the outlying portions of the park. These are enumerated in the acting superintendent's report, therefore it is not necessary for me to further dilate upon them.

Although considerable labour and expense have been entailed in the construction and re-location of portions of the old trail from Pocahontas to the hot springs, practically nothing has been done to improve the very crude accommodation for the numerous invalids who make the journey to the hot sulphur springs in order to benefit from their healing waters.

We now have the two transcontinental lines completed through the park, and during the coming summer expect the Canadian Northern railway will inaugurate a regular train service over their system, thus bringing additional tourists to explore and enjoy the beauties of Jasper park.

Amongst the distinguished visitors who explored the scenic grandeur of the park were Sir Arthur and Lady Conan Doyle; the Hon. Frank Oliver, and many others, who were charmed with all they saw.

The protection afforded to game of all kinds has resulted in a marked increase. The sheep and goats peacefully graze on the mountain slopes, and before long I anticipate they will be as indifferent to the presence of man as are the animals in the Rocky Mountains park at Banff.

A fire hall was built, a horse-drawn chemical engine purchased and installed. One fire occurred, which resulted in the destruction of a frame building occupied by the Royal Northwest Mounted Police. The efficiency of the volunteer fire brigade prevented the fire from spreading beyond the building in which it originated, and doing further damage.

A telephone line has been constructed for fire protection purposes, and eventually as the town grows in size it is hoped to install a system for the accommodation of the residents of the town of Jasper.

REVELSTOKE PARK.

In the spring of 1914 the Dominion Parks Branch decided to set apart 100 square miles of territory and add it to the district known as "Victoria park," north of the city of Revelstoke, including mount Revelstoke and other mountains. The Provincial Government had already made a survey of the route to the summit, and later had begun to construct a road. The Dominion Government then decided to continue it to the summit, and it was begun in July, 1914. The total length of this road, when completed, will be about 15 miles, and the area of the proposed park will take in some forty-eight sections, or 30,720 acres of rugged scenery. This land is of no use for agricultural or building sites, but eminently adapted for scenic purposes.

A pony trail has been built by the council of the city of Revelstoke from the town to the summit of mount Revelstoke, and some 4 miles beyond, to an elevation of 6,500 feet, and when I first visited the spot in September, 1913, it was over this pony trail that I travelled to reach lake Miller and lake Eva, and a cleft in the mountain, known as the "Everlasting Ice-box." A portion of the trail goes along the side of the mountain, where, beneath a heavy fall of rock, can be heard a stream rushing below known as the "Subterranean river." Lake Miller is a small lake, covering some 30 acres, surrounded by mountain tops, and with an island in the middle. The water is of an indigo blue, and reflects the mountain, making a beautiful picture. A fall of water can be heard but not seen, as it apparently runs under the mass of loose debris and enters the lake at the north end. Farther up is lake Eva, practically on the summit of the mountain; at the north end of the lake is an outlet over which the water falls in a silver thread, with a vertical drop of about 1,300 feet; it then later joins the stream which issues from the Gordon glacier. The view from the top is one of the finest obtainable, with snow-clad peaks, ice-fields, and lakes, and the Columbia river in the distance.

Some 500 persons ascended mount Revelstoke last season; the number was considerably more this year, but that many more will do so when there is a fine automobile road of about 15½ miles, winding up the mountain, from the summit of which such a splendid panoramic view is obtained, can easily be imagined.

The automobile road was begun during the second week of July, and on September 1, when the work unfortunately had to be closed down, over 2 miles of new road had been completed and opened for traffic, with the necessary bridges, culverts, and cribwork, and a large amount of work partially completed on the third and fourth mile. Had sufficient funds been available, the second 2 miles would have been completed before the middle of September.

A ski club was formed in Revelstoke this winter; ski-ing is now the favourite pastime, and every other person you meet, young and old, has a pair of skis. A ski carnival and jumping competition was held in February on the slopes of mount Revelstoke, which about 2,000 people attended. Mr. Grant Hall, of the Canadian Pacific Railway, was there and he was so interested that he took away with him some of the moving-picture films to have them developed. The officials of the club have chosen a hill on the slopes of mount Revelstoke, lying north of the hospital, which they say is equal to the famous hill in Blumendal in Norway, where all the world ski-jumping records are broken. The club intends, if possible, if the automobile road is completed, to hold a carnival on the summit of the mountain during the month of May or June.

I would strongly recommend that the work on the road, if conditions allow, be recommenced early this year as the Canadian Pacific railway have employed their representatives to take photographs of the park for moving-picture films, and the Soo line are advertising this park with a view to attracting the many visitors and tourists who will this coming season pass that way to and from the Panama-Pacific Exhibition at San Francisco. Many of these will no doubt stop off to see the beauties of this spot, and it will be very disappointing if the road, as advertised, is not completed to enable them to reach the summit. Owing to the unfavourable conditions on account of the war which exist and will continue, labour is still plentiful and work scarce, and this road would give employment to many in the neighbourhood.

I would also recommend that the boundary line of the park be fixed, as it will assist in the enforcement of the parks regulations and in any local improvements and developments.

All of which is respectfully submitted,

I have the honour to be, sir,

Your obedient servant,

P. C. BARNARD-HERVEY,

Chief Superintendent.

APPENDIX No. 2.

REPORT OF THE SUPERINTENDENT OF ROCKY MOUNTAINS PARK.

BANFF, ALTA., March 31, 1915.

SIR,—I have the honour to submit my second annual report as superintendent of Rocky Mountains park for the fiscal year ending March 31, 1915.

The tourist traffic for the season has not been up to the average, the only month which compared favourably with any of the summer months of recent years being July. This was partly due to the cold weather of the earlier part of the season, and later to the outbreak of war.

So far as development work in the park was concerned, we were able to accomplish a good deal before the war was declared, when all but emergency expenditure was necessarily cut down. We were able to do much in the way of road and trail-making and repairing, the details of which are dealt with elsewhere. Our water and sewer systems are in thoroughly good order; the water is up to the highest standard of purity and clarity in the Dominion, and our sewer system is the admiration of all strangers who come to Banff expecting to find conditions much the same as in other towns of a similar size.

We held one sale of lots in the spring, at which there was a good attendance and considerable competition. Our new telephone system, continuing the connection with the long-distance provincial telephone, will probably be in operation early in 1915. Our zoo and the animals in the Buffalo park are flourishing, although we have had some regrettable losses during the year, and generally speaking, all departments in the year-round life of the park are in perfect order.

Before going into details of the year's work and happenings, let me add that I am grateful for the loyalty of all the officials and employees who take directions from me and who have done their work whole-heartedly throughout the year.

I regret to record the death of the oldest office employee in the park, viz., Mr. D. C. Macdonald, who died in the month of October, after a short illness. He had been in charge of the revenue for some four years, and was a great favourite with everyone and exceptionally faithful in the performance of the multifarious duties of his office.

BUILDING CONSTRUCTION.

Building construction both by residents and the department has not been so brisk nor so long sustained as last year, the only outstanding building of any importance built by the department being the new bath-house.

The Lux block, which was partially destroyed by fire in February, 1914, has been rebuilt to a height of one story, the construction being fireproof throughout, and the intention is to add two more floors when the opportunity offers. This building has added greatly to the appearance of the main avenue.

During the year a first-class fire limit has been marked off in Banff, taking in half of blocks I and II, with the north and south boundaries denoted by the lanes intersecting these blocks.

SEWER AND WATER SYSTEMS.

Both the sewer and water systems of Banff are in excellent repair, and seventy connections were made during the year, including both water and sewer.

Continual care is exercised with regard to draining out pipes and seeing that they are laid below the frost line, so that little or no trouble was experienced on account of frozen pipes.

The water supply, which is periodically analysed, continues to be of the highest quality both as regards purity and clarity and, even in the heat of summer, the water is invariably icy cold.

AUTOMOBILE ROAD AND AUTOMOBILES.

Early in the month of August the two sections still uncompleted of the new automobile road in Rocky Mountains park were let to a firm of contractors who lost no time in putting large gangs of experienced men on the work.

When this road is finally completed and opened for automobile traffic, next year, there is no doubt that there will be a much greater influx of visitors travelling by automobile from both east and west. It is understood that the department intends altering the regulations so as to allow greater freedom in the movement of cars throughout the park, and especiallly those visiting Banff.

The number of automobiles registered at Banff during the year was about 250 as against 173 for the previous year.

ROADS.

Apart from the construction work on the automobile road, a good deal of repairing was done during the year. The Bankhead road was raked and dressed from the railway to Banff avenue; the road along the Bow river to the fish hatchery was regraded after the 20-inch sewer was put in, and top-dressed with crushed rock, and the right of way cut back and cleared of underbrush, while similar work was done down to near the Spray bridge, on the road from the Banff Spring hotel and from the hatchery via the middle avenue, known as River avenue down to the bridge and via the boathouse to the recreation grounds. All these roads are in splendid condition. When the work has been completed on Cave avenue, so far as regrading is concerned, following the putting in of the 62-inch main to the Cave and Basin, it is proposed also to top-dress this road with crushed rock.

The crusher has been kept at work at the foot of mount Rundle fairly steadily during the year, and is doing satisfactory work so far as the material turned out is concerned.

On the road from lake Louise to Moraine lake—the only road suitable for tally-ho traffic in this district—a considerable amount of work was done before orders were received to cease operations. The high banks at the Moraine end caused many slides which imperilled the safety of all kinds of vehicular traffic, and the material so displaced was used for re-surfacing purposes. The turning point at the end of Moraine lake was re-dressed and widened; large stones were raked off, and the road for a distance of about 2 miles from the lake was put into good condition. This was easily the worst part of the road, but much yet remains to be done at places along the entire 10 miles before it can be called a good and safe road, and I hope to be able, financially, to undertake the completion of this work next year. Owing to the spring freshets bringing down large quantities of material upon parts of this road every year, it will be absolutely necessary each spring to send at least two men to clear the boulders and other mountain-side material from the surface before the tourist traffic begins.

In the course of carrying out the general work of repair on this road the gang re-floored three or four of the small pole bridges across creeks, and cleared a good deal of encroaching underbrush.

The road from the Chalet to Lake Louise station was also carefully raked over.

In the month of May a good deal of cutting back of underbrush was done near Exshaw and on the Hot Springs road.

When the contractors at the Cave and Basin had done their part of the grading, there was a space of about 20 feet farther to be done by the department, which was completed about the beginning of December. I would recommend that a guard-railing of substantial design be erected at the corner of the new bath-house for the protection of rigs and children, as there is a very steep incline down to the level of the river at this point.

TRAILS IN THE PARK.

A large amount of work was done in connection with the extension of the network of trails throughout the park, a sum approximating $4,000 having been expended on this work.

During the summer, contracts were let for four trails, which will open up many attractive routes hitherto open only to the experienced woodsman. These trails are:—

	Miles.
From Carrot creek to lake Minnewanka	12
From Red Earth creek to Simpson summit, via mount Ball	17
Little Pipestone to head of Red Deer river	4½
Castle-Vermilion road to Twin lakes	4½

making a total of 38 miles of new trails. Added to this is 2½ miles of what will ultimately be a 5-mile trail from Boom Creek bridge to Boom lake, which will be completely built by our own game wardens, and which, when finished, will be an easy means of access to one of the very finest sheets of angling water in the Rocky mountains.

TOTAL MILEAGE OF TRAILS IN THE PARK.

	Miles.
Spray to mount Assiniboine	18
Banff to Spray lakes and Eau Claire wagon road	28
Bow summit	30
Banff to Fatigue creek	19
Pipestone trail	28
Cascade (Sawback to Bankhead)	28
Mount Edith trail to Sawback lake	24
Lake Minnewanka trail	14
Banff to Simpson summit	14
Canmore to Whiteman's pass and Spray lake trail	4
Tunnel mountain trail	1½
Sulphur mountain trail	3½
Carrot creek and lake Minnewanka	12
Red Earth creek and Simpson summit via Mount Ball	17
Little Pipestone to head of Red Deer river	4½
Castle-Vermilion road to Twin lakes	4½
Boom creek bridge to Boom lake (2½ miles completed)	5
Total	255

During the year our own wardens also did the usual work of clearing trails of fallen timber and encroaching brush, and it may be stated generally that all trails were in good condition during the past year.

Among other work to be undertaken next year, if the financial situation will permit, is the corduroying of the Bow trail, a distance of about 30 miles, at an approximate cost of $1,000.

GAME WARDENS' CABINS.

Closely allied to this question of trail building is the matter of game wardens' cabin accommodation. At the beginning of the year we had nine of these in commission, and during the past twelve months five more were built by our own men and

equipped for all emergency. The value of these cabins in the forest service can hardly be overestimated. They enable the men to almost indefinitely prolong their patrols when, in other circumstances, they would be compelled to return to their own or some other habitation each night.

The cabins are not locked up; they are available to all travellers by the way, the only stipulation being couched in the following language:—

> "This cabin is for the use of the fire and game warden. In his absence it may be used by campers, but must be left clean. Any person who takes from this cabin any tool or utensil, except for the purpose of fighting a forest fire, is liable to a fine of $100."

There have been no cases of any abuse of the privilege so granted, although it is largely taken advantage of according to the popularity of the particular trail upon which a given cabin may flank.

Some six or eight more of these cabins are projected for next year, and I hope the time will come when they will all be linked up with the game warden's telephone system.

INSTALLATION OF 20-INCH STEEL WATER MAIN.

The waterworks system of Banff is being rapidly extended to meet the necessities of the continued growth of the town, and it has now reached a size that makes the 10-inch main from the intake on Fortymile creek inadequate for the purposes required.

In 1905 the waterworks system for Banff was first planned and constructed. Water was taken from a small reservoir made by a loose-rock, crib-core dam on Fortymile creek, at a point distant 2½ miles from Banff as the wood stave main ran. Fortymile creek flows between Stoney Squaw mountain and Cascade mountain. This wood stave main was placed with an average coverfill of 3 feet, and where it has been exposed during recent construction operations it has been found to be in a remarkable state of preservation.

The water obtained from Fortymile creek is excellent in quality, and continues so throughout the year, with no trace of discolouration and sedimentation in flood periods.

The 20-inch steel water main proposed was to be considered as an auxiliary supply supplementing the existing 10-inch main, which was to be left in operation. When the construction of the 20-inch main was almost completed it was decided to install a concrete intake works with three sets of racks and screens adjacent to the existing dam, provision being made for the future construction of a concrete dam of greater height to replace the present loose-rock, crib-core dam. The existing screen chambers on the 10-inch wood stave line have been abandoned, and the intake for the 10-inch line has been incorporated in the concrete intake now constructed. Adequate provision has been made to avoid the difficulties due to surface, frazil, and anchor ice during the winter season. A masonry house has been built over the intake works so as to provide ample protection to the sluice gates, and also for an operator during the winter season should one become necessary.

The 20-inch main parallels the former 10-inch main for a greater part of the first mile of distance from the intake. At two points where the 10-inch line follows the base of Cascade mountain it has been buried in large rock slides. To avoid these the 20-inch line was carried across Fortymile creek and follows the west side for 1,300 feet, where it crosses the creek to the east side again. At the most southerly point of Cascade mountain the 20-inch line leaves the 10-inch line and runs due southwest through the goat pasture, passing under the Canadian Pacific railway tracks, across

the old moose pasture, under the Bankhead road, and instead of diverting towards Banff continues directly up upon the easterly shoulder of Tunnel mountain, terminating here in a small standpipe, adequately protected from frost, to act as an overflow medium. Ultimately, it is intended that a balancing tank be built to replace the standpipe and to serve the same purpose as the one originally built at the end of the 10-inch main on the shoulder of Sulphur mountain above Banff. "Without such a tank, acting as a balancing chamber, a sudden demand for water such as might be made when a fire occurred would at the outset tend to draw the water from the pipe system and thus reduce the pressure at a time when most needed, until the flow in the long system regained its flow conditions. The tank, open to the air, also obviates air troubles and water-hammer in such a long pipe."

The present town distribution system is connected with the 20-inch main by means of a 10-inch cast-iron branch line, running from a cross on the 20-inch line westwards along the Bankhead road to an intersection with the former 10-inch main at Fox street.

Ultimately it is proposed to carry the 20-inch line on past the balancing tank around the east side of Tunnel mountain towards the Canadian Pacific railway hotel to connect finally with the upper end of the distribution system of the town in that locality.

On December 24, 13,000 feet of 20-inch steel pipe had been laid and 1,335 feet of 10-inch cast-iron pipe, and all pipelines completed, including four 20-inch gate valves, two 6-inch blow-outs protected by concrete houses, and two air valves, besides smaller valves and specials. The intake works, a later development, under way at this time was completed during the winter, and the 20-inch line put in operation.

The 20-inch pipe has been covered throughout with 5 feet of material, and is amply safe against frost. Special attention has been given to the back-fill and cover-fill over the pipe, and to the proper bedding of same. The line has been thoroughly tested, partly under water pressure and partly under air pressure.

The usual construction difficulties have been met and overcome. The section between the Bankhead road and 200 feet north of the Canadian Pacific railway presented unusual difficulties, due to the presence of five small flowing creeks, clay impregnated with water, and quicksand in places. This section delayed completion of the work by about three weeks.

CLEANING UP THE TOWNSITES.

The annual clean-up or "Arbor Day" was fixed for May 6 for all townsites in the park except Banff, which held its annual clean-up day two days later.

There was a most gratifying response throughout the park, both by the general public and our own officials who had charge of the hauling of the gathered débris, and the result had a great deal to do with the generally clean and neat appearance of all the townsites during the season. Especially was this the case in regard to lanes and yards where débris, often of a noxious and fly-breeding character, is wont to gather. It is intended to make the clean-up day an annual event.

Mention might also be made, under this heading, of street cleaning and garbage collection, which is well organized in the town of Banff. The former has been most effective in conjunction with the sprinkling of the streets, in the laying of dust.

No concerted official action has yet been taken in connection with the institution of similar services in other towns in the park, but periodical reports show that the residents in these towns are paying more attention to sanitary measures, and with the exception of one or two isolated cases with regard to household and stable garbage, there have been no complaints during the year.

In connection with the tidiness of the towns, there might also be mentioned the general floral and other beautifications of the town of Banff. From the Banff Springs

hotel to the eastern end of Banff avenue, and on streets leading right and left therefrom, there has been a gratifying increase in the number of well-trimmed lawns and flower gardens, while a number of well-stocked kitchen gardens have been made. The boulevard in the centre of Banff avenue and the remodelling of the grounds at the R. N. W. M. P. barracks have added greatly to the first impression which visitors get of "Beautiful Banff."

SALE OF LOTS.

Only one sale of Banff lots was held during the past year, the autumn sale being passed over on account of the unfavourable financial situation. On May 16, seventy-four lots were offered at public auction, of which fifty-five were sold. Of the buyers all but very few completed the purchase price and paid the first year's rental, and not a few have begun building towards the completion of the year's agreement.

ELECTRIC LIGHTING OF BANFF.

Early in the year it was proposed to extend the street lighting system in the town of Banff, the additions to be made in such a way that when our own proposed power plant materalized, the system could easily be linked up with it.

The proposed extension called for 441 lights in addition to those already existing, 181 of 60-watt and 260 of 100-watt, and the distribution was carefully figured out and recorded. Such an extension would make Banff the best lit town of its size in the west, and I hope the work will soon be undertaken, whether the rate adopted be a flat one or determined by meter. The total cost of this extension would approximate $6,000, but I believe it would be money well spent. The cost of maintaining this service has not yet been ascertained, but a time table varying twice a month all the year round has been drafted and, with some allowance on the side streets for moonlight nights, will probably be adopted.

In connection with this proposed extension there has been submitted for examination a well designed standard to carry five-lamp clusters, intended to be placed on the grass boulevard on Banff avenue.

The wires have been extended to the new bathhouse, and the lighting tried out with completely satisfactory results. There are approximately 900 lights at the Cave and Basin premises, which give a very brilliant effect after darkness.

An extension which will be required in the very near future if all-the-year-round use is to be made of the building, will be to the recreation pavilion. It appears that the shortest route to this building is along the river bank, via the boat-house, and as the building is already wired the cost of such an extension would be small.

NEW BOW RIVER BRIDGE.

The Public Works Department started the preliminary work necessary to the erection of the new concrete bridge across the Bow river at the end of Banff avenue about the latter end of November, when the river had fallen sufficiently to permit of the work going on. The preliminary work consisted of the erection of pile piers at a spot about 80 feet east of the old site of the bridge, and the sliding of the four iron spans to these new piers. This somewhat hazardous work was expeditiously and carefully carried out without accident, the whole bridge being on its new site and ready for traffic by the end of January. In the meantime the ice on the river was in fine condition for traffic between the two banks. It is hoped that the new bridge will be completed during the coming year.

OTHER BRIDGES.

Repairs were effected during the year to Canmore bridge, to two bridges at Anthracite, and the Spray River bridge at Banff, while on the Lake Moraine road from lake Louise a number of small pole bridges were re-floored.

MACHINE SHOP.

All the material and appliances for the new machine shop at Banff have been on the ground for some time, but have not been installed owing to the temporary lack of access to the premises in which it is proposed to place them. This disability is expected to be overcome during the present year, and the employees of the department will be able to undertake a considerable amount of repair and construction work for which outside help is now necessary.

THE NEW LAUNDRY.

In the month of May the machinery necessary for the installation of a new laundry arrived at Banff, and was stored, pending the evacuation of the bunkhouse at the Cave and Basin by the contractors. Part of this building, when it has been properly finished, will be used to house the plant which is designed to handle all the laundry work of the department at Banff.

Hitherto this work has been done by hand on the respective premises at considerable expense, and it is expected that the new laundry will do the work more rapidly, efficiently, and economically than was possible by the old method. The linen will be collected periodically from all the departments having such work to do, and distributed within a stated time, and I think the institution should be a great convenience.

BANFF CEMETERY.

Several improvements have been made in and at the Banff cemetery. The ground has been surrounded by a fence of an uncommon and artistic rustic design; the cemetery has been thoroughly tidied, and when the new survey has been approved by the Surveyor General, everything will be in first-class shape.

TELEPHONES.

Contrary to expectation, we have not yet been able to get the new telephone exchange and extended system installed. All the poles for the extended system have been erected in the lanes throughout the town, tending to diminish the ugliness caused in cities by erecting poles on the principal streets. The other material is on hand and the building is ready for the installation as soon as conditions permit.

The only connections made during the year were to lines already carrying one or more telephones, as the board in use was already filled, precluding any further single instrument connections. A line was run from the Bankhead line to the house occupied by the keeper of the buffalo paddock and to the water supply intake.

There is now a line direct from the office of the Meteorological Observer to the Observatory at the top of Sulphur mountain which, in addition to being a convenience to the observer, is of great help to the fire wardens during the dry season, when a man is usually stationed on the top of the mountain in order to watch the surrounding forests.

GAME WARDEN'S TELEPHONE SYSTEM.

A start was made during the year with the construction of a telephone system for the game and fire wardens, and when the scheme is brought to a successful conclusion there will be a network of telephones throughout the area which they patrol.

A line 28 miles in length has been constructed to Canmore, and another, 9 miles in length, connects the warden's cabin at the east end of lake Minnewanka with the other end of the lake.

CAMPING IN THE PARK.

As in former years, there was a large number of campers in the Banff district, and elsewhere throughout the park during the summer of 1914, and I believe the year to have been a fairly average one in this connection.

The old public camping ground at the junction of the Bow river and Fortymile creek on the Canadian Pacific Railway ground was abolished this year, but the department gave permission to intending campers to pitch their tents in any place approved by the chief warden and endorsed by the superintendent, which compensated for the abolition of the old well-known camping ground. The following are the fees for permission to erect tents: $1 per month per tent on public ground for ordinary all-canvas tents; $1 per month per tent for shack tents on public ground, the first month's rental to also cover the building permit necessary in the case of these tents; $1 for a building permit to erect shack tents on privately owned lots, this to cover all charges for the season. There is no charge for plain canvas tents on privately owned lots.

The two most popular locations of the year for campers were on the line of the automobile road across the railway and up the Spray river on the north side of the bridge, while at least one large party selected a site close to the Middle springs, from which there is a good and short trail to the Cave and Basin.

VOLUNTEER FIRE BRIGADE.

There has been a volunteer fire brigade in Banff for many years, and although the organization was always to be depended upon to do its best when called upon, the facilities at their disposal for fire-fighting purposes were not commensurate with the progress of the town, both as regards the class of buildings and their increasing number.

I have nothing but the greatest praise for the men who form this volunteer organization. I have watched them turn out on many occasions during the past year, and was highly gratified with the apparent training which they have received, and with the smoothness and celerity with which every man takes his place. I should say a fair average for the turn-out of the chemical and the big hose-wagon is three to three and a half minutes. On the occasion upon which Chief Stenton rang in a trial call from the Banff Springs hotel, without previous warning, the brigade was at the hotel with the apparatus in eleven minutes.

The apparatus at the fire hall consists of one double hose-wagon, two hose-reels, one chemical engine, with the necessary horses, coats, helmets, axes and other appliances.

RECREATION.

The facilities for healthy out-door recreation in the park continue to be of a very high order, and are probably unsurpassed in any national park on the continent.

Apart from the well-planned pony trails all over the park area, giving opportunity for pleasant horse-back outings in air of intoxicating clarity, we have all-the-year-round swimming in the government baths, and splendid boating opportunities.

In spite of the fact that the number of visitors was rather less than in previous years, all these facilities were largely taken advantage of, although the liverymen had a poor season in the pony-hiring business.

Twenty-one hunting and exploring parties, according to the official register, outfitted at Banff, but that number by no means included all the parties who made Banff their rendezvous for trips in the mountains, but refers only to those parties who took out packers and guides with them.

No cases were reported of parties travelling in the park with unsealed firearms.

ANGLING.

The only legal killing sport in the park is that of angling.

I would suggest that, for comparative purposes, we might inaugurate some kind of a voluntary system of reporting the different catches on the various lakes and streams within our boundaries, as any figure which might be given at present must be based on mere guesswork.

So far as I am able to judge, the angling season was fairly successful in the streams, and especially so on the outlying lakes accessible, in the latter part of the journey at any rate, by pony trail only. The streams and lakes in the vicinity of the various towns within the park and in the vicinity of the various hotels and camps are always very heavily fished, and, notwithstanding the benefits of re-stocking which will increase as the years go by, I would suggest for your consideration the advisability of shortening the season, or at least of changing the dates between which it endures. This would have the effect of putting a stop to the wholesale killing of spawning fish at the end of the season, and would be no hardship to anyone.

Lake Minnewanka continues to give fine catches by trolling and occasionally by the fly around the deep-edged pools; but lakes Louise and Moraine are practically entirely depleted, the nearest good fishing from lake Louise being probably Consolation lake. The going to this lake from Moraine is good either on foot or by pony, but after the end of the trail is reached there are enormous boulders to clamber over before the water is attained, and this probably is one of the reasons why the fishing is usually excellent on this sheet of water.

The Bow river from Castle mountain right down to the Gap is diligently fished from the beginning to the end of the season by tourists and residents, and good catches are by no means uncommon. When the fish hatchery, which has already done good work, has been in existence for a few years more, we may expect satisfactory results from the large number of young fish that will be annually turned into the lakes and streams in the park.

RECREATION GROUNDS AND PAVILION.

Work on the new recreation ground proceeded smoothly during the year and was almost entirely completed by the time orders were given for the shutting down of practically all work, early in September. Those who remember the large noxious slough on the river side of Cave avenue which was famed for the number and varieties of its mosquitoes, will have difficulty in recognizing the place now.

The sewer ditch completed last year was opened into the new 20-inch sewer main, and a few weeks thereafter the ground was as hard as any piece of ground in the district. In addition to the gratifying diminution and almost total extinction of the mosquito pest, which was the stumbling block to the building of new residences along Cave avenue, there has been opened up a recreation ground which is a splendid asset to the district, and which has become a very popular rendezvous for residents and visitors alike, and more especially for the young people.

There are a baseball diamond, a football pitch and a cricket crease; space for field sports of all kinds, and a complete set of playground apparatus for the use of the children. It is estimated that of the last named more than 100 visited the playground every day during the open season, while the football pitch was in much demand by the local players.

As will be seen from a scrutiny of the number of visitors registering at the pavilion the building was largely patronized. It has, however, to be kept in mind that many visitors to the place did not register, and a conservative estimate puts the actual number of visitors at more than double the number recorded.

I have no doubt the building will be in much greater demand in the years to come. As a dancing hall it would be hard to beat, while the conveniences existing for social gatherings are complete in every detail.

Two excellent roads lead to the grounds and the pavilion one via the boat-house, and the other branching off Cave avenue a few hundred yards from the bridge.

WINTER SPORTS.

The Bow river was frozen over as usual during the early part of December, and hockey, curling, and skating were general throughout the season. No heavy fall of snow occurred until the first week in January, thus shortening very considerably the snowshoeing, tobogganing, and sleighing season. The toboggan slide, which is always a prominent feature of the winter season in Banff was got into operation about the middle of January. Owing, however, to the general depression prevalent in the west, the season was not so successful in point of number of patrons as in the immediately previous years, although the local people were as enthusiastic as ever in all branches of winter sports. The game of curling received a big fillip, for various reasons, and the bonspiel was attended with the usual success.

BOARDS OF TRADE.

The Board of Trade in Banff showed commendable activity during the year in the discussion of matters affecting the locality, including the employment of labour, and other kindred subjects.

Arising out of discussions at the Banff board meetings, one great improvement has been carried out, viz.: the numbering of the houses on the various streets in the town. It was an improvement which cost very little, yet which will be a great convenience to visitors to the town in the matter of locating addresses.

During the year a similar board has been formed in Canmore, with the object of furthering the trade of the town, and its general welfare.

MILK INSPECTION.

The periodical inspection of the milk supplies available for public consumption has been undertaken by the government storekeeper, who has had experience in that direction, and the analysis made on the occasion of each individual inspection has invariably produced satisfactory results. In no case has the percentage of fat been below the statutory requirements, and formaldehyde has only once been reported as being present in the liquid.

CONTROL OF DOGS.

For some years when the number of dogs in the park were less numerous, the regulation regarding license fees and dogs running at large became very much of a dead letter. This resulted in a gradual increase in the number of dogs until they became somewhat of a nuisance so far as chasing game was concerned. There were no, or very few, concrete cases to take action upon, but the fact remained that there were general complaints in this direction. It was therefore decided to put the regulation again into active force.

For the purpose, a dog catcher was employed for three months and placed on the game warden's staff, and during the summer he collected nearly a hundred fees, besides, with the consent of the owners who did not care to pay the annual fee, destroying a large number of animals. The annual license fee is $3 for the male and $5 for the female.

FOREST FIRES.

Technically, the fire season begins according to the Railway Commission, on the 1st of April each year, when the railway company and our own staff are supposed to put on patrols. This was too early, however, for Rocky Mountains park, but when the dry season did arrive, the patrols did effective work. Indeed the only three fires of the slightest consequence that we had during the year were those which occurred at lake Minnewanka, on Fortymile creek behind Stoney Squaw mountain, and at the side of the railway near Laggan. This last fire occurred at a time when the railway company's patrol had been taken off by the general superintendent of the Alberta division of the Canadian Pacific railway, without the permission of the Railway Commission. The damage done by the three fires was practically nil, the only real damage being done behind Stoney Squaw mountain, where a quantity of second-growth jack pine was destroyed. We had, however, to keep two or three men at this spot for some weeks in order to make sure that the fire did not get beyond the guard again. Copious rains, occurring about the end of August practically made danger from forest fires negligible.

THE PARK AND THE WAR.

The various towns and districts in the park did well as regards their share in the war, not only in men, but in money and in kind. The complete statistics for the whole park are not available, but it is known that many of the younger Canadians belonging to Canmore, Bankhead and Banff volunteered and were accepted for the front. The Austrians and other alien enemies at Bankhead and Canmore total a fairly large number—approaching 200—but there was not the slightest trouble with them.

ANTHRACITE.

During the fall of 1914 the chief superintendent and the chief game warden made inquiry as to the removal or destruction of the unsightly old buildings in the deserted village of Anthracite. These buildings constituted a veritable eyesore to passers by in train and by road and it was very desirable to have them removed.

Towards the end of the year the disappearance of these buildings had gradually begun, but operations were stopped by the advent of winter.

BANKHEAD.

The Bankhead townsite is administered by the Natural Resources Department of the Canadian Pacific Railway Company which has valuable coal mines in the townsite, so that the park administration has little to do with that district.

There has, however, been a considerable movement in recent years for the establishment of a local cemetery to obviate the necessity for funerals coming into Banff, a journey of some 4 miles. During the year both the resident engineer and I have looked over the available ground in comparative proximity to the town, and the feeling locally, with which I concur, leads to a site on a hill banking on the Lake Minnewanka road, and less than a mile from the town. I hope we shall be able to undertake the necessary work to open up this ground during the coming year.

The Bankhead Mines Company has established electric power for various kinds of work in its mines, in place of compressed air. From this plant it is expected there will ultimately be a surplus sufficient to moderately light the streets of the town as well as the houses of the workmen.

CANMORE IMPROVEMENTS.

Early in July work was begun on a plank sidewalk and road grading in Canmore which has greatly improved the main street in the town.

At the same time a full set of playground apparatus was erected on the recreation ground, and improvements were also made there to the extent of about $600. The playground was much in demand during the open weather, and the children took full advantage of the slides and swings.

It had been hoped that in the supplementary estimates sanction would be given for going on with the construction of a permanent water supply for the town. There is crying need for an adequate and properly distribnted water supply here, and I hope that the work will be undertaken in the near future.

There also remains to be done a good deal of road work in the town which, too, should receive the early consideration of the department.

Another desirable improvement at Canmore is the installation of an electric lighting system for the town. I found, on inquiry, that the Canmore Coal Company have installed at No. 2 mine, an electric power plant to take the place of the compressed air plant. This plant consists of an electric generator of about 300-k.w. capacity, and it is expected that there will be quite a surplus of power. The proposal to furnish electric power to the town was canvassed by the company and heartily endorsed by the people. Owing to the necessary curtailment in appropriations, however, it was impossible to do anything towards the lighting during the past year.

VISITORS TO THE PARK.

A few days before the outbreak of war His Royal Highness the Duke of Connaught, Governor General of the Dominion, Her Royal Highness, the Duchess of Connaught, Princess Patricia, and a large and distinguished party came to Banff, but owing to notice which His Royal Highness received, the visit was hurriedly terminated and the party returned to Ottawa, after staying only three days. The visit was intended as a purely private one and, on that account, there was no public manifestation of welcome. During his short stay, His Royal Highness and several of his party had a good day's fishing coming from Castle to Banff, on the Bow river, in canoes.

Among the other distinguished visitors to the town during the four months of May, June, July, and August, were: Sir T. Shaughnessy and Mr. Geo. Bury, C.P.R.; Mrs. Geo. Hamar-Jackson, journalist, London, England; Ernest Thompson-Seton, Cambridge, Conn., U.S.A.; Bailie MacMillan and City Clerk Walker, Glasgow, Scotland; Rt. Rev. Bishop Pinkham; a party of six Milwaukee capitalists; Prof. Max Eastman; Senator Lougheed and party; Mr. and Mrs. Martin Nordegg; Prof. Baumgartner, Kansas, and party of twenty-two; Dr. Walcott and wife, Philadelphia; Dean Paget; Miss Jobe, New York; D. McNicol, C.P.R.; S. H. Bowman, jr., Minneapolis; Bishop Sweeney, Toronto.

I have the honour to be, sir,

Your obedient servant,

S. J. CLARKE,
Superintendent.

BANFF HATCHERY.

This hatchery, which was erected during the summer of 1913, is situated between Green and River avenues near the Bow river falls, in the Banff National park.

The hatchery building is 54 feet 4 inches long, 31 feet wide and 10 feet high from the top of the sill to the bottom of plate. It is fitted up with 30 hatching troughs grouped in clusters of five, with passages 2 feet wide between each cluster. Each trough is 15 feet 7 inches long, 10½ inches wide, and 6½ inches deep. The residence of the officer in charge is adjacent to the hatchery, and is 32 feet long, 27 feet wide and 20 feet high.

Last season, 1913-14, 1,000,000 eyed salmon trout eggs, which were collected in lake Superior, were transferred from the Port Arthur hatchery, and the resultant hatch distributed in Minnewanka, the only lake in the district to which salmon trout is indigenous. These eggs did exceptionally well during the winter, and hatched with a loss of little over 1 per cent. The greater portion, 963,000, was distributed as fry, and the balance was retained and fed in the hatchery troughs throughout the summer; 19,000 were distributed in September, and the remainder, some 3,500, were distributed in November.

Every reasonable effort was made by the hatchery officers to collect eggs of the cut-throat trout in different streams where such fish were reported to be most plentiful. These operations were not as successful as desired, as few fish of spawning size could be found. The cut-throat trout fry that did hatch were carried through the winter in the hatchery troughs with a view to raising them for breeding stock.

As last season's operations indicated that any considerable number of cut-throat trout eggs cannot be obtained in waters from which they can be transferred to the hatchery in satisfactory condition, two large ponds were built in the summer of 1914.

The larger is 120 feet by 52 feet at water level, and has a depth of 4 feet in the deepest part. This pond will be stocked to as large an extent as possible with cut-throat trout, and it is expected that a considerable number of eggs will be obtained from fish so impounded in future seasons.

The smaller pond is 82 feet by 28 feet at water level, and is 3 feet deep. It will be used principally for rearing purposes.

Arrangements are also being made to increase the present accommodation for the raising of fry to the fingerling stage, and a number of tanks for this purpose will be installed at an early date.

The hatchery is fitted up with the latest fish-breeding appliances, and when the improvements that are now under way are completed it will be second to none.

REPORT OF CONSTRUCTION OF NEW BATH HOUSE, BANFF, ALTA.

Actual construction was commenced by the contractors for the work on this building at the beginning of April, 1914.

The necessary excavation, piling and concrete work for the foundation had already been done by the department, and the contract only included the completion of the swimming pool, superstructure, drains, supply pipes, etc. Work was carried on without interruption from the beginning of April until the beginning of December, when the contract was completed.

The walls of the building are constructed of reinforced concrete, faced on the outside with blue limestone quarried in the locality, the inside face being rubbed smooth and then painted. The intention of the architect in using the local limestone for the outside facing was to have a building that would harmonize with the surroundings and scenery, and it is admitted by all who have seen it that the building is very successful in this respect.

At the northeast and southeast corners there are two belvederes, constructed of the stone and roofed with red Spanish tile, which lends an attractive touch of colour to the grey limestone walls of the building. The northeast belvedere is to be used as a shelter for the public during inclement or rainy weather, and will afford an excellent view of the swimming pool as well as of the surrounding scenery. The southeast belvedere gives access to the natural cave in Sulphur mountain. This cave contains the small pool with the hot sulphur springs, and also fantastic rock formations in the walls and roof, and is lighted by a natural shaft extending to the surface of the ground. The tunnel between the belvedere and the cave has been paved with concrete, and electric lights installed at intervals. As this cave is always a popular resort with tourists, the increased facilities for access to it should be much appreciated.

The swimming pool is 150 feet long by 35 feet wide, and is the largest of its kind in Canada. At the shallow end the depth is 3 feet, from which it gradually deepens to 8 feet. Diving blocks, chutes and spring boards have been installed so that bathers will have every facility for enjoying themselves. A scum trough extends around the edges of the pool, the water being drawn off by pipes, thus preventing the accumulation of scum on the surface, which it would otherwise be impossible to prevent, owing to the water being so highly impregnated with sulphur. The walls and floors of the pool are lined with porcelain brick so that it can easily be kept clean and sanitary. Supply pipes have been laid from the natural pool, so that an ample supply of hot sulphur water is assured. A drain pipe has also been laid from the deep end, and the pool may be rapidly emptied by means of this pipe whenever it is considered desirable for cleaning or other purposes.

Dressing rooms, capable of accommodating 132 persons, have been built along the south side of the pool. The roof over these dressing rooms and over the entrance portico form two terraces and a promenade, which are reached by stairs at the south-east corner of the building. The terraces are each 4 feet wide, and the promenade 25 feet wide. As a splendid view of the pool may be had from either of the terraces or the promenade, it is to be expected that they will prove very popular in fine weather.

Light is supplied to the dressing rooms by means of luxifer prism lights in the floor of the terraces and promenade, the light being diffused by means of an arch of diffuser sashes extending over the dressing rooms; this arch is also fitted with five hundred 25-watt Mazda lights for the supply of artificial light when necessary.

A steam heating plant capable of developing 80 horse-power is being installed, and is to be used also for operating a laundry plant to be run in connection with the bath-house. A small hot-water heater will also probably be installed in order to keep the water in the pool up to an average temperature of 90° in cold weather, when owing to the large surface of the pool there will possibly be a lowering of the temperature of the water.

APPENDIX No. 2A.

REPORT OF THE CURATOR OF BANFF MUSEUM.

BANFF, ALTA., March 31, 1915.

SIR,—I have the honour herewith to submit my tenth annual report of the Rocky Mountains Park museum for the year ending March 31, 1915.

The conditions due to the war have had very much to do with the falling-off in the number of visitors to the museum, as well as in the visitors to the park; the war also effecting material progress.

During spring I continued cataloguing the plants of the museum herbarium, and adding additional specimen sheets.

The prairie anemone, or passion flower (*pulsatilla hirsutissima*), our first spring plant to flower, commenced to flower on April 11; this was called the Buffalo flower in the early days, because of the buffalo relishing these succulent bulbed plants in the spring.

During spring, summer, and fall I was partly occupied in making collections of reptiles, salamanders, frogs, toads, leeches, and shells, and incidentally gathering insects, plants, palæontological specimens, etc.

A small collection of spiders was made, and these, with others collected previously, are being determined by Prof. J. H. Emerton, of Boston, U.S.A., with whom I had two or three outings.

The collection of bees and wasps was revised by Mr. Sladen, apiarist of the Experimental Farm, Ottawa.

Card holders for the bird pictures in use were placed in the bird cases.

Birds, mammals, reptiles, and batrachians of the museum were catalogued, including necessary information. Most of this work was done after office hours.

I revised the museum handbook for Mr. Harlan I. Smith, and sent additional matter for the second edition.

I freshly filed considerable office material, attended to correspondence both from Ottawa and elsewhere, and to visitors.

From excavations being made on Cave and River avenue, some few bones of long-buried mammals, probably elk and buffalo, were unearthed. This apparently used to be an elk country.

Several trips were made in the fall on an unsuccessful hunt for a supposedly new sulphur cave on the west side of Sulphur mountain.

A small amount of carpenter work was done in the spring to the interior of the museum, maps framed, etc.

The following additional exhibits were added during the past year:—

REPTILES.

No. 6.—Wandering garter snake (*Thamnoplus ordinoides elegans*). From Banff, Alta. Presented by J. W. Hill, Banff, Alta.

No. 14.—Flat-footed salamander (*Ambystoma macrodactylum*). From Banff, Alta.

FROGS AND TOADS.

The Western frog (*Rana pretiosa*). From Banff, Alta.

Variety of Northern frog (*Rana cantabrigiensis latiremis cope*). From Banff, Alta.

Northern toad (*Bufo boreas*). From Banff, Alta.

The snakes, salamander, frogs, and toads were determined out of a collection sent to Mr. A. G. Ruthven, of Ann Arbor, Mich.

BIRDS.

American white pelican. From Bow river, Banff, Alta. Collected by Mr. H. E. Sibbald, chief game guardian. The first pelican known to have been seen in the Rocky Mountains park. Clinging to the inside membrane of the pouch were quite a number of parasites, *menspon titan*, identified by Dr. C. Gordon Hewitt, Dominion Entomologist.

Snowy owl (*Nyctea nyctea*). From Daysland, Alta. Presented by T. J. Kay, of Banff, Alta.

Two pigmy owls (*Glaucidium gnoma gnoma*). From Banff and Georgetown, Alta. Presented respectively by Mr. B. S. Fox, Banff, Alta., and Mr. H. Brice of Georgetown, Alta.

Swainson's hawk (*Butes swainsoni*). From Spray lakes, Whiteman's pass, Rocky Mountains park. Presented by Louis Mumford, game gardian, of Banff, Alta.

Two American magpie (Pica pica hudsonia). From Banff, Alta. Presented by H. E. Sibbald, chief game guardian of Banff, Alta.

One white wing crossbill (*Loxia leucoptera*). From Banff, Alta. By curator.

Six gray crowned leucosticte, or rosy finch (*Leucosticte tephrocotis tephrocotis*). From Banff, Alta. From E. J. Ballard, of Banff, Alta.

One western robin, young (*Planesticus migratorius propinquus*). From Banff, Alta. By curator. (Killed flying against museum window.)

SKINS.

Northern shrike (*Lanius borealis*). From Banff, Alta. From curator.

MAMMALS.

Four muskrats (*Fiber zibethicus*, Linn.) From Banff, Alta. Purchased.

One Rocky Mountain wild cat skin. From foot of Devil's Head mountain, Alberta. Purchased.

One common shrew (*Sorex personatus*, Geof.). From top of Sulphur mountain—altitude 7,500 feet—Banff, Alta. February 9, 1915. From curator.

Several mammals are being kept for their skeletons.

INSECTS.

Amongst the moths added to the museum collection were: *Scotogramma subjugata, Noctua incarnea.*

A number of craneflies (*Tipulidæ*) collected in the park were determined by Dr. W. Dietz, of Hazelton, Pa.

ARCHÆOLOGY.

Twenty-one specimens from British Columbia were received from Mr. Harlan I Smith, Archæologist, Mines Department, Geological Survey, Ottawa.

PALÆONTOLOGY.

A fine photograph of the fossil fish (*platysomus canadensis* Lambe) was received from Mr. Lawrence Lambe, F.R.C.S., Ottawa. This large fossil fish was presented to the museum by Mr. Wm. Peyto, of Banff.

Interesting specimens of petrifactions of wood and leaves, etc., from near lake Minnewanka. Presented by E. J. Balard, of Banff.

MINERALS.

Specimens of talc were presented to the museum by E. J. Ballard, of Banff—from Vermilion pass, Rocky Mountains park.

FLORA.

I found a number of plants of the salmon-berry or white flowering raspberry (*Rubus nutkanus mocino*) near Banff. Not recorded before from the Rocky Mountains park.

LITERATURE.

Pamphlets on the fish of the park, by Mr. S. C. Vick, fishery inspector, of Banff, Alta., and a Museum Handbook compiled by Mr. Harlan I. Smith, Archæologist, Geological Survey, Ottawa, were received in quantity for distribution to visitors. They fill a long-felt want, and it is hoped that other park literature will soon be available for use.

MOLLUSKS, SHELLS.

Zonitoides arboreus, Say.
Pyramidula cronkhitei, Newcomb.
Pisidium compressum, Prime.
Pisidium abditum, Hald. The hidden pea shell,
Valvata sincera, Say.
Physa hetrostropha, Say.
Planorbis parvus, Say.
Planorbis exacuous, Say.
Planorbis trivolvis, Say. The 3-coiled orb snail.
Lymnœa techella, Hald.
Lymnaea desidiosa, Say.
Lymnœa sumassi, Baird
Lymnœa palustris, Mull (var).
Lymnœa palustris nuttalliana, Lea.
Lymnœa stagnatis, Linn.

SOME PHENOLOGICAL NOTES.

Birds—first seen, 1915: Western robin, March 15; Mountain bluebird, March 16; Buffle-head duck, March 21; Mearn's junco, March 23; Meadow lark, March 19; Mallard duck, March 24; Ruffed grouse (drumming), March 18.

Pigmy owls, rather rare in Banff, were seen occasionally during fall and winter.

American magpies were more common than usual during fall and winter.

Richardson's grouse have increased considerably, as well as the grey ruffed grouse.

Red-breasted nuthatches were occasionally seen and heard during the winter.

Snowflakes were fewer and less often seen during the past winter—arriving November 4, 1914, and departing about the middle of March, 1915.

Plants.—On March 21, 1915, an anemone, (*pulsatilla hirsutissima,* Brit.) was found in bloom. The earliest known record. In 1889 this plant was in bloom on Tunnel mountain, April 4. The latest date recorded is April 28, 1899.

Mammals.—Mule deer were quite common during the past winter, sometimes resting close to residences.

Heather.—On July 16, 1914, I started for Simpson pass, instructions having been received to collect 3,000 more good specimens of purple heather. Mr. Hugh Sibbald acted as assistant, doing good work under trying conditions of flies and heat.

In all, some 5,000 specimens of heather were collected and dried, of which over 3,000 specimens turned out very well for the purpose required. This meant incessant work early and late, and without my assistant's faithful help could not have been accomplished before the heather was practically over.

I also staked several clumps of heather in bud in different situations in order to find how long it lasts from the bud till the petals of the flower fall. I found that under average conditions as to weather and locality a purple heather plant lasts about from a week to ten days from bud till petals fall, or is in flower not more than three to five days.

Few birds were observed; these were: Americal crossbill, western chipping sparrow, eagle, Canada jay, warbler, red-breasted nuthatch, longtailed chickadee, Richardson's owl, thrush, another species of owl, pine siskin.

Of the mammals seen, porcupines were plentiful, rubbing against the sides of the tent at night with their mournful whine; marmots, perhaps three species abundant. Fresh prints of bear about camp—black-tail.

Few insects seen: of butterflies, *argynnis astarte* was one of the very few seen. Craneflies were rather numerous.

SPRAY LAKES.

A trip of four days to the Spray lakes, Whiteman's pass, resulted in a collection of some interesting museum material, including crustaceans, insects, water shells, batrachians, and fossils, the latter including a fine specimen of *productus* sp.

SULPHUR MOUNTAIN.

Fred Ashley, of Banff, fire and game guardian, was stationed on Sulphur mountain, living in the Meteorological Service building from August to September 3, 1914. I requested him to kindly keep the number of people and horses who reached the top of the mountain while he was there. His report is: 1914, August 4 to September 5: number of visitors, 572: number of horses, 117.

I had roughly estimated that 1,500 people climbed the trail to the top of Sulphur mountain in a year, and I do not think my estimate is far out.

This trip is much enjoyed by visitors, and a shelter should be built on top of the mountain in a suitable locality and a small shelter, say half-way down the mountain. Sudden squalls of rain or snow may come up any time, and I am sure these shelters would be very much appreciated at all times.

The past winter has been really very fine, much less snow on Sulphur mountain than usual, and after breaking a trail in November after a heavy fall of snow no more difficulty was experienced on this score, the trail being in splendid shape for snowshoeing all winter.

REQUIREMENTS.

Under present conditions I only make mention of what is more or less really necessary for the museum: Metal cabinets for the storing of much plant and insect material; extra cases for mammals and birds; more specimens.

ACKNOWLEDGMENTS.

I have to acknowledge kind assistance received from the following gentlemen for determining specimens: different members of the staff of the Experimental Farm, Ottawa, including Dr. C. Gordon Hewitt, Chief Entomologist; Mr. P. A. Taverner, Victoria Memorial Museum: Mr. Harlan I. Smith, Archæologist, Geological Survey, Ottawa; Prof. A. G. Ruthven, Ann Arbor, Mich.; Dr. W. Dietz, Hazelton, Pa., naming *Tipulidæ;* Dr. Wm. H. Dall, Curator of Mollusks, United States National Museum, Washington, D.C.; Mr. F. H. Wolley Dod, of Millarville, Alta., *noctuidæ;* and others.

The weather report is appended.

I have the honour to be, sir,

Your obedient servant,

N. B. SANSON,

Curator Rocky Mountains Park Museum.

APPENDIX No. 2B.

ANALYSIS OF NATIONALITIES OF VISITORS TO ROCKY MOUNTAINS PARK.

Bathers at the Upper Hot Springs from April 1, 1914, to March 31, 1915:—

Canada	16,161
United States	310
England	108
Scotland	31
Ireland	13
Australia	12
Germany	2
Mexico	2
South Africa	4
Holland	3
Italy	4
China	5
Total	16,655

Bathers and visitors at Cave and Basin, April 1, 1914, to March 31, 1915:—

Number of bathers passing through turnstile	17,904
Visitors at Cave	9,377
	27,281

Visitors to the Cave from—

Canada	4,677
United States	4,502
England	86
Scotland	44
Ireland	23
New Zealand	11
Australia	15
New South Wales	3
Newfoundland	4
South Africa	6
Ceylon	2
China	4
Total	9,377

N.B.—Owing to construction work, the Cave was closed for the months of June and July.

VISITORS AT RECREATION PAVILION.

The following is an analysis of the visitors registering at the recreation pavilion from May 1 to September 30, 1914:—

Canada	1,004
England	29
Scotland	29
Ireland	3
Wales	3
Isle of Man	2
Australia	3
New Zealand	3
New South Wales	1
United States	93

South Africa	2
France	4
Egypt	1
China	1
Denmark	1
Germany	2
	1,281
Unregistered (estimated)	2,000
Driving parties	3,000
	6,281

PICNICS.

May	25.—Calgary Band	800
	27.—Large week-end influx	600
	30.—Private party	50
June	3.—Many visitors without organized excursion	2,000
	27.—Knox Presbyterian Church, Calgary	700
	29.—Strathmore holiday	500
July	18.—Church of the Redeemer, Calgary	1,500
	18.—Hudson Bay employees, Calgary	1,200
	Salvation Army, Calgary	950
	22.—High river, Nanton, and other town holiday, with boy's band	1,500
	23.—Grace Presbyterian Church, Calgary	250
	29.—Calgary Brewing Company	1,500
Aug.	7.—Calgary C. P. R. Engineers	1,700
	Methodist Sunday School, Calgary	100
	8.—Protestant Cathedral, Calgary	100
	19.—Scandinavian newspaper men	60
	Unorganized parties	2,500
	Total	15,780

Statement of Persons registered at Banff Springs Hotel, Banff, Alta., Season 1914:—

Alberta	1,584
British Columbia	277
Manitoba	25
Saskatchewan	167
Winnipeg	395
Newfoundland	2
	2,450
Alabama	5
Florida	8
Georgia	22
Kentucky	17
Louisiana	15
Mississippi	1
North Carolina	3
South Carulina	3
Tennessee	22
	96
Arkansas	1
Kansas	16
Kansas City	38
Missouri	13
Nebraska	19
Oklahoma	4
Omaha	27
Texas	36
	154
Connecticut	40
Delaware	4
Dis. Columbia	49
Maine	7
Maryland	26
Massachusetts	284
New Hampshire	22
New Jersey	89
New York	694
Pennsylvania	228
Rhode Island	12
Vermont	3
Virginia	8
West Virginia	7
	1,473
Belgium	14
Bahamas	1
Egypt	2
Philippine Islands	4
Italy	1
Ireland	5
India	7
Switzerland	2
Norway	1
Holland	3
	40
New Brunswick	13
Nova Scotia	22
Ontario	552
Prince Edward Island	3
Quebec	165
	755

Arizona	9
California	257
Colorado	29
Idaho	7
Los Angeles	154
Montana	23
Nevada	2
Oregon	119
San Francisco	205
Washington State	165
	964
Milwaukee	41
Minnesota	64
Minneapolis	120
North Dakota	23
South Dakota	5
Utah	1
St. Paul	59
Wisconsin	54
	367
Africa	3
Australia	96
Austria	2
China	15
England	324
France	22
Germany	15
Turkey	2
Hawaii	17
New Zealand	24
Scotland	39
Japan	1
	560
Chicago	350
Cincinnati	54
Cleveland	47
Detroit	54
Illinois	83
Indiana	57
Indianapolis	14
Iowa	89
Michigan	62
Ohio	134
Pittsburg	63
St. Louis	95
	1,102
Unlocated	61
Total, 1913	13,193
Total, 1914	8,022
Decrease	5,171

Statement of Persons registered at Chateau Lake Louise, Lake Louise, Alta., Season 1914:—

Alberta	716
British Columbia	174
Manitoba	34
Saskatchewan	104
Winnipeg	250
	1,278
Alabama	5
Florida	9
Georgia	37
Kentucky	13
Louisiana	20
Louisville	2
Mississippi	11
North Carolina	3
South Carolina	10
Tennessee	23
	133
Arkansas	1
Kansas	30
Kansas City	53
Missouri	35
Nebraska	70
Oklahoma	11
Omaha	24
Texas	50
Utah	1
	275
Milwaukee	67
Minnesota	79
Minneapolis	191
North Dakota	14
South Dakota	15
St. Paul	73
Wisconsin	102
	541
Connecticut	52
Delaware	10
Dis. Columbia	54
Maine	12
Maryland	42
Massachusetts	317
New Hampshire	27
New Jersey	103
New York	806
Pennsylvania	420
Rhode Island	20
Vermont	9
Virginia	9
West Virginia	18
	1,899
New Brunswick	19
Nova Scota	11
Ontario	521
Prince Edward Island	1
Quebec	124
	676
Arizona	3
California	326
Colorado	22
Idaho	24
Los Angeles	245
Montana	9
Nevada	8
Oregon	132
San Francisco	271
Washington State	270
	1,310
Illinois	200
Chicago	523
Cincinnati	62
Cleveland	68
Detroit	60

Indiana	77
Indianapolis	25
Iowa	172
Michigan	111
Ohio	156
St. Louis	22
	1,476
Africa	3
Austria	2
Australia	96
England	328
France	14
Germany	16
Hawaii	14
Alaska	4
India	7
Ireland	6
New Zealand	31
Scotland	35
Belgium	4
West Indies	5
Italy	1
Japan	6
China	15
Channel Islands	2
New South Wales	19
Mexico	2
Switzerland	2
Canary Islands	1
Sweden	2
Turkey	3
Egypt	2
	619
Unlocated	73
Total, 1913	12,826
Total, 1914	8,280
Decrease	4,546

Number of visitors registered at Mount Royal Hotel, April 1, to September 15, (hotel closed):—

Canada	2,515
United States	483
England	53
Scotland	13
Ireland	3
South Africa	3
Japan	2
New Zealand	12
Australia	13
Mexico	1
China	4
Germany	2
Fiji Islands	2
Ceylon	1
Borneo	1
India	1
France	2
Total	3,106

Number of persons registered at the Grand View Villa, May 17 to December 31, 1914:—

Canada	521
U. S. A.	38
Newfoundland	1
	561

Number of visitors registered at King Edward Hotel, April 1, 1914 to March 31, 1915:—

Canada	3,086
United States	470
England	17
Scotland	6
Ireland	5
Australia	25
New South Wales	10
New Zealand	21
France	1
Spain	2
Germany	1
China	2
Sweden	1
Total	3,647

Number of visitors registered at The Homestead and Bungalow Temperance Hotel, during June, July, August and September, 1914:—

Canada	1,095
United States	220
England and Scotland	20
Australia	15
Austria	1
Total	1,351

SUMMARY.

Banff Springs hotel	8,022
King Edward hotel	3,647
Mount Royal hotel	3,106
Grand View hotel (closed for part of year)	561
Homestead and Bungalow	1,351
Hot Springs hotel—estimated—	2,150
Lake Louise Chalet	8,280
Picnics, estimated	15,780
Summer cottagers, estimated	5,000
Total	47,897

APPENDIX No. 2C.

REPORT OF THE ALPINE CLUB OF CANADA.

BANFF, ALTA., April 1, 1915.

The Alpine Clubhouse, perched on its eyrie high above the town, was again open all the season, and in spite of the paucity of travel as compared with former years, attracted a large number of visitors.

Again the club-house was visited by many strangers who came to enjoy the magnificent view and to obtain detailed and accurate information about the mountain region. The house is set upon a hill where it cannot be hid, and acts as a focus for many eyes, arousing interest and inquiry.

An ascent was made of mount Edith, and club expeditions were made to the Ptarmigan lake country and to the neighbourhood of mount Assiniboine. Much regret was expressed that access was not made easier to this magnificent district by the establishment of good trails and of rest houses where travellers could find accommodation at reasonable rates for a night or more, thus attracting a class of pedestrian tourist which has made Switzerland what it is in the world of travel to-day.

Members of the Club-house were drawn from the following places:—

CANADA—

British Columbia—Revelstoke, Sydney, Vancouver, Victoria.

Alberta—Calgary, Edmonton, Edson, High River, Lethbridge, Macleod, Olds, Vulcan.

Saskatchewan—Prince Albert.

Manitoba—Brandon, Cartwright, Winnipeg.

Ontario—Elgin, Galt, Ottawa, Strathroy, Toronto.

Quebec—Montreal.

Nova Scotia—Windsor.

United States—

District of Columbia—Washington.
Illinois—Chicago, Galesburg, Rockford.
Indiana—Lafayette.
Massachusetts—Boston.
New York—Brooklyn, New York.

England—Eton, London.

New Zealand—Auckland.

Switzerland—Grindenwald.

Austria—Vienna.

APPENDIX No. 2D.

REPORT OF TIMBER AND GRAZING INSPECTOR.

Banff, Alta., April 9, 1915.

Sir,—I have the honour of submitting to you my first annual report as Timber and Grazing Inspector of the different parks.

My appointment as inspector did not take effect until near the first of July, consequently the time at my disposal was too short to allow me to visit all the parks.

During the month of July I visited the Spray Lakes district, on my way there passing the Eau Claire Company's timber berth and over Whiteman's pass. There is a nice body of timber (merchantable) along this trail as far as the game warden's cabin at Whiteman's pass. From here as far west as Bryant creek I found that there had been a splendid growth of spruce and pine, but the fire had swept through the valley, practically destroying all the green timber in the district, although during the intervening years a magnificent growth of young pines had replaced those killed by the fire. The young trees have attained a height of from 15 to 30 feet, and they stand so thick on the ground that they are almost impenetrable.

Several different companies have been operating in this district for a number of years; last year one of them took nearly 40,000 logs down the Spray and Bow rivers as far as Canmore, and at the present time the Canmore Coal Company have skidded on the banks of the Spray river between 35,000 and 40,000 logs preparatory to driving them down the coming season.

I also inspected the timber on both sides of the Bow river as far west as Castle mountain, and from there I went west over the Vermilion pass.

On the south side of the Bow river, with the exception of a few miles, I found that the fire had destroyed the merchantable timber, but reproduction had taken place and in most places there was a nice stand of timber covering the ground, and the same is true of the north side.

From Castle mountain west over the Vermilion pass a recent fire had destroyed some timber on both sides of the automobile road but there is still left a nice body of merchantable timber, making the automobile road over the Vermilion pass one of the most beautiful scenic roads to be found any place and, when the road is completed through to British Columbia, for beauty it will be second to none in North America.

I also visited the valleys of the Cascade, Stoney creek, Cut Head, and the Panther.

With the exception of three or four small bodies of green timber, all the merchantable timber in these valleys had been burnt a number of years ago, but reproduction was taking place, with the exception of about 8 miles in the Cascade valley, and, for some unaccountable reason there is not more than 1 per cent reproduction here.

Along the Cascade there is a large body of dry timber, but the many obstacles encountered in driving this stream have prevented any one from taking this timber out. There is more or less of this dry wood scattered all through the different parks, and on account of its accessibility it is much sought after for fuel, lumber, and mine props.

The following cabins were built during the past season, and inspected by me: one cabin at Whiteman's pass, 12 miles from Banff; one on Healy creek, 8 miles southwest of Banff on the trail leading over the Simpson pass; one on the Ghost river, 18 to 20 miles northeast of Banff; one on Cut Head creek, about 25 miles north of Banff. The department took over and rebuilt a two-room cabin in the Vermilion pass. There was also built, this past season, at the junction of the Panther and Red Deer rivers a nice, cosy, four-roomed cottage and stable for housing the saddle horses used during the winter months, this being the headquarters of the game warden who looks after the horses that range here during the winter season.

All the cabins within the bounds of the Rocky Mountains park, with the exception of one or two, are supplied with stoves, bunks, and fire-fighting tools.

Although the past season was an exceptionally dry one, we had only one fire in the parks that caused any great amount of damage, and that was in Yoho park, where several thousand acres of land were burnt. The loss in merchantable timber, however, was infinitesimal.

During the fiscal year just ended, nearly 160 dry-wood permits were issued, and large quantities of logs, cordwood, and mining props have been removed from the different parks during the season, all adding materially to the revenue of the parks. I might also state that quite a number of grazing permits were issued during the year. The number of horses and cattle grazing within the different parks is rapidly increasing each year, and the fees derived from this source should materially assist, as the years go by, in increasing the revenues of the parks.

In closing I wish to say that all residents and non-residents seem to live up to and respect the timber and grazing regulations.

I am, respectfully yours,

J. F. MORRISON,

Timber and Grazing Inspector.

APPENDIX No. 3.

REPORT OF THE SUPERINTENDENT OF YOHO AND GLACIER PARKS.

FIELD, B.C., March 31, 1915.

SIR,—I have the honour to submit herewith my first annual report as superintendent of Yoho and Glacier parks, for the fiscal year ending March 31, 1915. As I did not receive this appointment until September, the season's development work in these two parks was practically over before I took charge; I shall therefore in this report have to draw largely from the information contained on the various files in this office, together with what knowledge I have been able to gather from observation in my different trips through the parks since my arrival.

YOHO PARK.

Work was commenced in this park at the beginning of May. Just as soon as the ground was dry enough the streets in the village of Field were thoroughly cleaned of all refuse, which was hauled to the nuisance ground; the streets were raked over, and those sidewalks which needed repairing were attended to. One hundred balm of Gilead trees were planted on the different streets, replacing those which had died since last year, and also extending the rows on three streets which were then gravelled where they required it.

Attention was then given to the Emerald Lake road. Ditches for draining purposes were cleaned out and in places gravel was spread. All culverts were also put in a thorough state of repair. Two sectionmen's cabins were built on this road, one near the 2-mile post and the other near the 4-mile. This road, which leads to the famous Emerald lake, where the Canadian Pacific Railway Company have their well-known Chalet, is now in perfect condition and is one of the most beautiful and enjoyable drives to be found anywhere in the mountains. This route was also largely used by tourists when on their way to Summit Camp, which was run by the same company, with their popular manager, Captain Loyd, in charge. At this camp the traveller could enjoy all the delights of real camp life, without having those few discomforts which most campers have to contend with and from here he could make a number of beautiful and interesting trips.

On the Emerald Lake road it was also necessary this spring to do a considerable amount of cribbing in order to change the course of the Kicking Horse river, which was making inroads into the bank and cutting out the road. Opposite the Canadian Pacific Railway Company's depot, a footbridge was built across the river to the athletic grounds; this bridge is 200 feet long, supported by three cribs filled with rock, and has a hand-rail on either side. The Yoho road next received attention. On this road a considerable amount of work was done. It was found necessary to replace the stringers in the bridge over the Kicking Horse river at mile 4 and also the planking. Between miles 4½ and 5, a survey was made with the object of reducing the grade, which was very heavy at that point. This work was done during the month of June, so that we now have a grade of from 5 to 10 per cent where formerly the grade was about 18 per cent. This work was on a very steep side hill and necessitated a great deal of cribbing to hold the material moved to make the road-bed. On this hill the distance was also reduced some 300 feet. Beyond this hill and up to the 5-mile board, the road through the woods was widened to 16 feet, and was all re-gravelled. Two sectionmen's cabins were also built on this road. These cabins should prove of great use to us, as we shall be enabled to keep two or three men on each road during the summer months, who will be able, except when special work is undertaken, to keep these roads in a thorough state of repair. During the month of July, a force of men started to work widening the Yoho canyon. This being all rock work, is of necessity very slow, but it was hoped to have been able to complete the work this summer, and had it not been for the Wapta fire I think this could have been done; but on account of the size of this fire it became necessary to take the whole gang of men from the Yoho road in order that they might assist in getting it under control. Then, when the fire was finally extinguished, our appropriation was so nearly exhausted that it was necessary to close down all road work for the season. However, I trust that with your approval next season we shall be able to complete this road, which is a great favourite with the tourist, and which for scenic beauty cannot be surpassed anywhere in the mountains.

TRAILS.

During the season considerable work was done on trails. In May, a small force of six men was sent out to make a diversion on the way to Leanchoil. It was found

necessary to leave the river bank and build 1 mile of new trail, as the old one was very badly washed out in places, and was impassable on account of mud holes. The trail to the fossil beds was also cleaned out during this month.

The trail from Ottertail bridge south towards lake McArthur for a distance of 8 miles was cleared, and from Takakkaw falls to Twin falls and the branch to the Yoho glacier. In doing the latter trail nearly a mile of new trail near lake Duchesney had to be re-located and also on the branch to the Yoho glacier. Lake Duchesney had risen so high that horses had to swim to get along the old trail. Burgess pass trail was also cut out, culverts repaired and all put in good shape. Later in the season about 4½ miles of new trail were cut up the Ottertail river, to where McArthur creek flows into it, and from thence up McArthur creek for a distance of about 1¾ miles. This trail opens up a very large country, and in the event of a fire in that part of the park would be invaluable.

About 3 miles of trail on high land not far from the Little Yoho river were located, cleaned out, and about half a mile of side-hill work done. After the trail was constructed it was used by the Alpine Club, and was pronounced by the members to be a great improvement upon the one by which they went into camp. The next trail is high and dry, and the scenery from it is fine.

At the big bridge where the Ottertail road crosses the river we erected a fire warden's cabin. From this point the country can be seen for miles around, and a warden stationed at this spot would have no trouble in locating any fire situated in his district. It is most essential that our fire patrols, both in the Yoho and Glacier parks, should be both thorough and efficient. We have to be constantly on the alert to guard against the carelessness of campers and tramps passing through the parks, who in spite of all warnings will leave their camp fires without first seeing that they are properly extinguished, or throw their matches and cigar ends into the bush, and it is only by keeping a careful watch and promptly suppressing these fires before they are able to gain headway that we are able to preserve our timber, which is one of our greatest assets, not only for its market value, but more particularly for its scenic qualities.

During the summer the Alpine Club of Canada held its ninth annual camp in the Upper Yoho valley. Over 200 attended from all parts, and I understand that they all thoroughly enjoyed the outing and were pleased with the beauties of the park. I am inclosing a short account of their camp which the secretary, Mr. S. H. Mitchell, was kind enough to send me. I also inclose a statement of the guests registered at the Mount Stephen hotel at Field and the Summit Camp, Yoho. These figures show quite a large decrease in the number of visitors, but with the exceptional conditions which prevailed during the last half of the year, it was only to be expected. There is no doubt in my mind, however, that the public realize more each year the wisdom of reserving these parks, and appreciate the advantages to be derived from them.

GLACIER PARK.

As usually happens on account of the great depth of the snowfall in this park, it was not possible to start work until the beggining of June. Then Foreman Patterson went to Glacier to open up the work there, with instructions to clear the side ditches and attend to the necessary gravelling and repairs on the first 4 miles of the road to the Caves. This work was completed in June, as well as the clearing and repairing of the trails from Glacier House to the Great glacier, and also from the Glacier House to the Asulkan glacier, and to the Glacier crest. The trail from Rogers pass to Glacier was also attended to.

In July a gang of men started to continue the construction of the road to the Nakimu caves, still under the foremanship of Mr. Patterson. Good progress was made until the end of August, when on account of the heavy expenditure which the Wapta

fire had entailed, work had to be discontinued. This road has now reached a point a little over a mile from the Caves, and from there on there is a good trail. I had the pleasure of making a trip from Glacier House up to the Caves in October last. Leaving the hotel at 9 a.m., I walked up in a little over two hours, taking plenty of time on the way, and although I have been twenty years in the mountains, I was never more impressed with the grandeur of mountain scenery than I was on this occasion. Every mile of the road gave an entirely different view, until I emerged on the beautiful little flat where Mr. Deutschman, the government caretaker of the Caves resides. Mr. Deutschman has made some very great improvements to his house this summer. The additon of a good-sized sitting room with a large open fireplace, will well repay the time and labour that he has spent on it, and will be greatly appreciated by his many guests. During the last season he had 197 people sign their names on his register, and many others visited the Caves who omitted to sign. I trust that during the coming year we may be able to finish this road to the Caves, and so make this wonderful trip possible for those who are not able to walk so long a distance, or who do not feel equal to a ride on horseback.

In this park the Canadian Pacific Railway Company are driving a double-track tunnel through mount MacDonald. This tunnel will be 5 miles in length when completed, and will be the longest in North America. It will eliminate the loops on the western side and also about 5 miles of snowsheds, and will reduce the distance by some 4 miles, besides cutting down the grade enormously. This work is due to be completed in December, 1916, and if the contractors, Messrs. Foley Bros., Welch and Stewart are able to maintain their present rate of progress, they will be finished well within their time-limit.

In conclusion, I wish to thank all officials, of both the Yoho and Glacier parks, for the generous support they have given me in the discharge of my duties since my appointment, and also all those other officials with whom I have had the pleasure of coming in contact, including yourself, sir, all of whom I have found ready and willing to render me whatever assistance lay within their power.

I am, sir,

Your obedient servant,

E. N. RUSSELL,

Superintendent, Yoho and Glacier Parks.

ANNUAL CAMP OF THE ALPINE CLUB OF CANADA.

The Alpine Club of Canada held its ninth annual camp in the meadow at the head of the Upper Yoho valley from July 21 to August 11, 1914. The prolongation of the period to three weeks was found to afford general satisfaction and was pronounced a success. In all, 206 were placed under canvas, the largest number yet recorded. Mr. W. W. Foster, M.P.P., attended as the official representative of the British Columbia Government, and expressed his great satisfaction at the wonderfully successful work the club was doing in making public the attractions of the mountain regions, both for the province and also for the Dominion of Canada. Mr. P. C. Barnard-Hervey, the general superintendent of Dominion parks, in the examination of the magnificent new trail being built in the Upper Yoho made several visits to the camp, seeing it in all its moods, and also spoke appreciatively of the work being done for Canada.

Dr. Emerton, of Boston, the distinguished student of spiders, was probably the most widely known of the men of science present. Dr. C. Barck came from St. Louis

to continue his study of North American glaciers and snowfields. The Hon. Mr. Justice Galt, of Winnipeg, represented the law; Dr. W. E. Stone, President of Purdue University, Indiana, the Very Rev. Dr. Robinson, of St. Johns College, Winnipeg, formerly Dean of Belfast, Ireland, and Miss E. L. Jones, of Havergal College, Winnipeg, the tutorial profession. In fact there were members of all professions present. Mr. C. J. Collins, the English artist, made many sketches, and will hold an exhibition of his finished pictures of the mountains in England when peace again prevails.

There were present, members of the English, Swiss, and American Alpine Clubs, the Appalachian Mountain Club of Boston, "The Mountaineers" of Seattle, and the "Mazamas" of Portland, Oregon.

A subsidiary camp was placed near the Yoho glacier, which was very popular. The following peaks were climbed, several of them by varied routes: President, Vice-President, Marpole, Kerr, Kiwetinok, Pollinger, McArthur, Isolated, Habel, Gordon, and Balfour.

Extended trips were made not only through Emerald pass and the whole of the Yoho valley, but into the Kiwetinok valley and over the Daly glacier, to Sherbrooke lake. Ninety-two passed the test for active membership upon the various peaks.

A synopsis of places represented by members is given below, arranged by provinces, states, and countries:—

CANADA—

British Columbia.—Fernie, Kelowna, Revelstoke, Seymour Arm, Vancouver, Vernon, Victoria, Wilmer.

Alberta.—Banff, Bow Island, Calgary, Coutts, Cowley, Edmonton, Lundbreck, Medicine Hat, Macleod, Namaka, Strathcona, Vulcan.

Saskatchewan.—Moosejaw, Prince Albert, Regina.

Manitoba.—Brandon, Kemnay, Winnipeg.

Ontario.—Hamilton, London, Ottawa, Strathroy, Toronto.

Quebec.—Montreal.

Nova Scotia.—New Glasgow.

UNITED STATES—

Connecticut.—Greenwich.

Illinois.—Chicago, Galesburgh.

Indiana.—Lafayette.

Massachusetts.—Boston.

Missouri.—St. Louis.

New York.—New York.

North Dakota.—Grand Forks.

ENGLAND—

Ascot, Eton, Hitchen, London.

SCOTLAND—

Ayr.

SWITZERLAND—

Grindenwald, Interlaken, Lucerne.

AUSTRIA—

Vienna.

SESSIONAL PAPER No. 25

Statement of persons registered at the Mount Stephen hotel, Field, B.C., season 1914:—

Alberta	601	New York State	192
British Columbia	524	Pennsylvania	131
Manitoba	6	Rhode Island	5
Saskatchewan	50	West Virginia	6
Winnipeg	46		
	1,227		492
New Brunswick	1	Milwaukee	30
Nova Scotia	5	Minnesota	32
Ontario	156	Minneapolis	29
Quebec	38	North Dakota	12
Prince Edward Island	1	St. Paul	15
	201	Wisconsin	16
			134
Alabama	1	Chicago	93
Florida	2	Cincinnati	8
Georgia	7	Cleveland	10
Kentucky	2	Detroit	13
Louisiana	3	Illinois	64
Mississippi	5	Indiana	8
North Carolina	2	Indianapolis	2
Tennessee	5	Iowa	22
	27	Michigan	30
		Ohio	45
		Pittsburgh	56
Arizona	3	St. Louis	32
California	113		
Colorado	5		343
Idaho	2		
Los Angeles	2	Africa	5
Montana	2	Australia	38
Nevada	4	Austria	3
Oregon	38	China	5
San Francisco	58	England	102
Washington State	45	France	4
	272	Germany	6
		Turkey	1
			164
Arkansas	1		
Kansas	7		
Kansas City	2	Hawaii	2
Missouri	5	India	3
Nebraska	9	New Zealand	15
Oklahoma	3	Scotland	11
Texas	6	Wales	4
Mexico	3	Belgium	3
	36	Yukon	1
			39
Connecticut	13		
Delaware	2	Unlocated	75
District of Columbia	22		
Maine	2	Total, 1913	4,716
Maryland	6	Total, 1914	3,010
Massachusetts	79		
New Hampshire	7	Decrease	1,706
New Jersey	27		

Statement of persons registered at Summit Camp, Yoho, season 1914:—

California	60	Maryland	1
Cincinnati	2	Minneapolis	21
Colorado	7	Minnesota	23
Connecticut	2	Michigan	8
Florida	2	Montana	5
Idaho	5	Nebraska	2
Illinois	61	Nevada	2
Indiana	2	New York	86
Kansas	2	New Jersey	4
Massachusetts	38	North Dakota	2

Ohio	19
Oregon	4
Pennsylvania	8
Texas	4
Washington	8
Wisconsin	8
	396
Ontario	64
Manitoba	43
Nova Scotia	4
Alberta	97
Saskatchewan	25
Quebec	2
British Columbia	44
	279
England	24
Scotland	6
Wales	2
	32
Africa	1
Australia	4
Austria	2
France	1
Germany	4
China	1
Turkey	1
West Indies	1
	15
Not known	32
Total	754

Statement of persons registered at Glacier House, Glacier, B.C., season 1914:—

Alberta	173
British Columbia	610
Manitoba	15
Saskatchewan	35
Winnipeg	125
	958
Nova Scotia	4
Ontario	138
Quebec	48
	190
Alabama	1
Florida	5
Georgia	17
Kentucky	5
Louisiana	8
Louisville	4
Mississippi	5
North Carolina	4
South Carolina	2
Tennessee	13
	64
Arizona	3
California	168
Colorado	24
Idaho	2
Los Angeles	104
Nevada	6
Oregon	58
San Francisco	90
Washington State	77
	532
Arkansas	1
Kansas	9
Kansas City	23
Missouri	3
Nebraska	20
Oklahoma	2
Omaha	1
Texas	18
	77
Chicago	299
Cincinnati	43
Cleveland	29
Detroit	34
Illinois	65
Indiana	33
Indianapolis	11
Iowa	53
Michigan	39
Ohio	73
Pittsburg	63
St. Louis	52
	794
Milwaukee	42
Minneapolis	66
Minnesota	29
North Dakota	5
St. Paul	28
Wisconsin	25
	195
Connecticut	34
Delaware	3
District of Columbia	21
Maine	3
Maryland	17
Massachusetts	174
New Hampshire	11
New Jersey	53
New York	377
Pennsylvania	130
Rhode Island	9
Vermont	4
Virginia	8
West Virginia	2
	846
Africa	7
Australia	28
Austria	2
China	12
England	158
France	8
Germany	9
Turkey	2

Hawaii	7	Sweden	3
India	2	Java	2
Ireland	3		319
New Zealand	34		
Scotland	14		
Switzerland	1	Unlocated	34
Wales	1		
Japan	7	Total, 1913	5,057
Strait Settlements	4	Total, 1914	4009
New South Wales	14		
Philippine Islands	1	Decrease	1,048

APPENDIX No. 4.

REPORT OF THE SUPERINTENDENT OF BUFFALO PARK.

WAINWRIGHT, ALTA., March 31, 1915.

SIR,—I have the honour to submit herewith my third annual report as Superintendent of Buffalo park, for the fiscal year ending March 31, 1915.

The weather at the beginning of our present fiscal year was very stormy and cold, so that we had a late start with our farm operations, it being the middle of April before we were able to get on the land with our seed drills. However, when the weather did break up it turned very fine, and we were successful in getting all our grain in by the end of the month. Three hundred acres were put under crop, the seed-bed having been prepared during the fall of the previous year. After the seeding operations were completed, we put all our outfits on breaking up more new land, as it was necessary to have more land under cultivation on account of the very light nature of our soil, and after the second crop on this light land it will be necessary to summer-fallow every other year in order to ensure a good crop each year. During the summer we turned over another 300 acres of new land which gives us now 600 acres of land under cultivation at winter quarters. Three hundred acres will be ample for us to crop each year for green feed and feed oats; from it we shall be able to furnish sufficient feed oats for all the parks in Alberta, as well as Buffalo park, and the remaining 300 acres can be summer-fallowed, which will make sure of a good crop the following year.

We commenced cutting our grain the first day of August, working two binders, which were kept going to their full capacity for two weeks, Sundays included, in order to get the grain cut before it shelled out. We cut 90 acres of this land for green feed in oat sheaves, and the balance was cut for feed oats. The returns were very satisfactory for light land. From 210 acres we threshed out 14,384 bushels of feed oats, all being placed in portable granaries by the machine. Three thousand five hundred and two bushels of this grain have already been shipped to Rocky Mountains park, Banff, and 535 bushels to Elk Island park, Lamont, and we hope to ship 1,000 bushels to Jasper park in the spring.

When the threshing was completed we immediately set to work and ploughed up 200 acres of stubble land. This land has only been cropped once, and will be in good shape for another crop in the spring. The remaining 100 acres of stubble which have been cropped twice will be summer-fallowed next summer. We have now 500 acres of land prepared in splendid shape for the seed drills in the spring, besides 32 acres of land at the Wainwright end, which was summer-fallowed last summer. This 32 acres will be used for green feed in sheaves only. In view of the present conditions we thought it best to have all the land available prepared for seed in the

spring. I presume there will be no trouble in disposing of all the oats that we can raise next year. We should have in the neighbourhood of from 22,000 to 23,000 bushels over and above our requirements.

Our farming operations were completed on the last day of October, after a most successful year.

On July 12, our outfits pulled up to Wainwright and put up 75 tons of hay at Wainwright, as well as 25 tons at Rocky Ford. The cost of putting up hay at the Wainwright end is a little greater on account of the long hauls, which cannot be avoided. On July 27, our haying operations were completed at Wainwright and Rocky Ford and the outfits were then put back on the meadow at winter quarters, where 500 tons of first-class hay were put up, completing the haying operations on the meadow on August 26. We were very fortunate this year in having all our haying and threshing operations completed before the rainy weather set in. Three days after our threshing was completed, the last day of August, the rainy season set in, but instead of its being a detriment to us it was a real benefit as it placed the land in excellent condition for the fall ploughing.

On the first of November we commenced hauling hay from the meadow to the hay corral adjacent to the feed grounds, and commenced feeding at winter quarters on November 15, the earliest on record. My object in feeding so early was to keep the stock in good condition for the rough weather. During the month of September, when the stock usually looks its best, we found they were not up to the mark, especially the young stock. This was no doubt due to so much rain in September, when the prairie grass usually cures, but this year it did not get a chance to cure properly before it was hit by the frost. However, in October, the young stock seemed to improve wonderfully, and after being on the feed ground for a while they were in splendid condition, and I am pleased to say at the time of writing that I never saw the stock look better for this season of the year. I attribute this largely to the green feed and the good oat straw that they are getting regularly with their hay.

During the summer I had all the buildings painted, which puts them in first-class shape for a few years.

I am pleased to report that the shrubs and trees around the superintendent's quarters have done very well, and have now reached the stage when pruning will have to be started to obtain the best results. I intend placing a man at this work the very first thing in the spring.

During the month of August I had a small office built on the south side of the superintendent's residence. This accommodation has been greatly appreciated, indeed, as well as being a great help in furthering the work.

During the month we also constructed a number of cement fence posts of different designs, as an experiment. Owing, however, to having so many other operations on hand at the time and during the entire fall, we were unable to get any erected, but this will be done the first thing in the spring. I am informed by local contractors that these posts can be made for three dollars a post, or less. If so, I am sure they would be the cheapest investment in the long run, as our wooden posts do not appear to last any length of time.

We also received a number of steel lines and corner fence posts for experimenting with. These posts look well, but I do not think they would prove a success here on account of the stony nature of our fence line. I was given to understand that a representative of the fence company was coming out to see that the posts got a fair trial, but he did not come and we waited so long for him that it became too late to erect them in the fall on account of the frost.

Our fencing operations this year comprised only the fencing of the farm with posts two rods apart and 7-foot wire, and the fencing of a horse pasture at winter quarters. As a portion of the farm had been fenced with low wire which was of no service in that capacity, we removed it and made use of it for the fence at the horse

pasture. We had not sufficient posts on hand to fence the farm this year, and we were obliged to use all the available posts we had, but by taking every other post out of the main fence between the farm and the meadow, we were able to string the wire with the posts two rods apart. We had great difficulty in keeping the buffalo out of the paddock at winter quarters, as it is also fenced with low wire, and as our crop was too valuable to take any chances with, we did the best we could with what we had. The gaps in the farm fence and the main fence at the meadow will be filled in the spring, as we have now sufficient posts on hand to complete this work.

I intend, with your approval, to commence erecting immediately a high wire fence dividing the paddock at winter quarters from the main park, as soon as the frost is out of the ground in the spring. This is absolutely necessary, as this paddock must have a chance to grow up untouched during the summer months.

I hope next year that we shall be able to cross fence the park so as to divide our herd and breed up. This herd, or a portion of it, has been running together now for almost five years, and there is no doubt that a great deal of interbreeding is going on which should be cut out as much as possible. I should also like to see the corrals erected as proposed this year if at all possible.

The new telephone line, a double-wire system with 24-foot poles, was constructed last fall from the superintendent's residence to winter quarters and thence to Hardisty gate, and has been of very great service and is very valuable from the fire protection point of view. The line works perfectly and is a great source of comfort to all in the park.

The fireguarding was let by contract again this year, and the guards placed in fairly good shape. A couple of sweeps of the discs would have made a splendid job of it, but we were obliged to discontinue this operation, owing to the present crisis. I feel, however, that we are in fairly good shape now, with the telephone line installed. The usefulness of the guard was proved last spring when a prairie fire occurred on the south side of the park. The fire ran between the guards for a distance of 5 miles, doing no damage at all to the fence line. Next year all the fireguarding will be done by our own teams, as we shall have no more land to break on the farm.

I am pleased to be able to report that all our horses have come through the season's work in splendid shape, as well as the horses wintered here from Jasper park. All are in fine condition. We have bred all the mares this year, and I look for a good bunch of young stuff next year. We only had four colts this year, which was due to a horse used the year previous proving to be no good.

WILD ANIMALS.

The buffalo have kept up their good record by giving us an increase of 202 this year. The loss for the year was small. Three bulls and one cow died, and two bulls were so badly crippled that there seemed no hope of their pulling through the winter, so I had them killed. I regret to have to report a great number of cripples this year among the cows, which is due to the rutting after the ground was frozen and slippery. We will make another effort in the spring to get another count on the buffalo according to sex.

I am pleased to report that the elk have done exceptionally well, giving a natural increase of 10. They are in excellent condition.

The moose show an increase of three and a decrease of one cow, which was killed by a bull moose. The cow was a decided loss to the park, as she always gave an increase of twins each year. The browsing for the moose in the home paddock at Wainwright, where they have always been confined, is becoming thin, and we were obliged during the spring and summer to turn out nine head, leaving a couple of young bulls and four old bulls for tourist attractions. Those turned out into the big park have done splendidly which, of course, is only natural considering the immense amount of browsing to be had.

We have only three antelope left, one having been killed and devoured by coyotes during the summer. All that we now have are males. I have been experimenting with the two male antelope at the Wainwright end and find that by leaving them in the open at all times they do far better than by giving them protection in the shed, as was previously done. We have kept them in the open now for two winters, and they are certainly doing well and look a hundred per cent better than when given protection. I believe we could make a success of raising the antelope now if we had another chance.

The mule deer in the main park are doing exceptionally well; although we have been unable to secure their exact numbers, the increase, I am sure, is good. Upon one occasion this fall our rider counted forty-seven at one time.

The animals in Buffalo park are as follows:—

Animals.	Total last fiscal year.	Increase.	Decrease.	On hand.
Buffalo	1,444	202	6	1,640
Elk	32	10	..	42
Moose	13	3	1	15
Antelope	4	....	1	3
Mule Deer	70[1]	30	..	100
Total animals in park	.....	.....	.....	1,710

[1]Estimated.

I am pleased to report that the feathered game are becoming more at home each year within the park limits, where they apparently realize they are protected. We had one infraction of the park regulations this year, the first infraction of the regulations on record. The offence, however, was not very serious. The party had shot a bird outside the park limits and went inside to get it when it again flew and he shot at it inside the park limits. He was immediately caught by the game wardens and arraigned for trial. I do not think that there will be any further attempts of this nature in the future.

Our total number of visitors to the park this year from April until November, when it was closed to visitors on account of the foot-and-mouth disease in the United States, was 2,710, all a purely Canadian tourist traffic.

Upon bringing my report to a close I wish to make special mention of my assistant, Mr. W. H. Douglas, who had full charge of all the operations at winter quarters, which proved to be such a success. The services of Caretaker Terpening in handling the stock are also worthy of mention. These two men take a deep interest in their work, and can always show results, and the success of all operations I attribute greatly to them.

In conclusion, I wish to heartily thank yourself and the commissioner for your valuable assistance in making this a most prosperous year for the Buffalo park.

I am, sir, your obedient servant,

W. E. D. McTAGGART,
Superintendent.

APPENDIX No. 5.

REPORT OF THE SUPERINTENDENT OF ELK ISLAND PARK.

Elk Island Park, Lamont, March 31, 1915.

Sir,—I have the honour to submit herewith my fifth annual report as superintendent of Elk Island park for the fiscal year ending March 31, 1915.

I should like to be able to report a more successful year, but owing to the continued wet weather and the outbreak of war, very few of the works were completed.

The spring brought the usual cleaning of the grounds and repairs to the roads. The grounds around the buildings I had raked and the rubbish burned. Also a number of improvements were made. A new machine shed was erected for storing our machinery, one end of which is partitioned off for a tool house. In the picnic grounds I had a number of rustic seats made, a driveway constructed around the boundary of the park which skirts the lake three-fourths of the way, and a footpath made along the lake shore on the south side of the grounds. This work was very much appreciated by the public.

ROADS.

Two culverts were put in on the main road to the superintendent's house, and two others on the road through the buffalo corral, and graded up. In my last report I mentioned having started a road from the north of the park to Sandy Beach which I hoped to finish this year. We started to work on this road in May but were soon forced to abandon it for the time being owing to the heavy rainy season which set in very early, making the ground too soft to work. In September we went back to it again, but shortly after the outbreak of the war put a stop to all work, so I am sorry to say that the road is not yet finished. As it serves the double purpose of a road and fireguard, I should like to see this work completed soon, and may add that if the grounds at the beach were laid out and the road finished, Elk Island park would be one of the finest resorts of northern Alberta.

FIREGUARDS.

During June we had so much rainfall that the fireguards could not be disked until the latter days of July and the first of August. The weeds had by this time made such progress that it required a great amount of work to make a success of it, but I am pleased to say that we were able to put it in very good condition.

FENCES.

Last winter we had 1,600 tamarack fence posts taken out by contract, 1,250 of which were delivered on the east side of the park and the remainder at the park buildings, where they were piled up for reserve. We found we had to use the latter quite frequently to replace a broken post here and there, as the old posts are in a very poor state and easily broken, owing to the fact that they were put into the ground with the bark on. In the early spring I had the 1,250 posts on the east side peeled and treated with antiseptine, and during the summer these were set in place in the east fence, with the exception of a few sloughs which were full of water. This fence should stand for years, and it would be well if the remainder were treated in the same manner.

HAYING.

In former years we experienced considerable tronble in having our hay put up by contract, so this year we purchased a mower and hay rake and put up the hay by day labour. This method has proved very satisfactory. Two hundred tons of first-class hay were put up, at a much smaller cost than formerly, and owing to the fact that we were ready to start haying at the proper time we were favoured with excellent weather.

VISITORS.

Owing to the foot-and-month disease in the United States, the park was closed to the public on November 16. Up to this time we had 1,457 visitors, most of whom seemed very much pleased with the park in general. It would be a good thing if we had more boat accommodation, and I would suggest that the lake be stocked with fish suited to its nature. Years ago numbers of jack fish were caught here, but they appear to be run out as none have been caught in the past five years.

ANIMALS.

I am pleased to report all the animals in fine condition. We have an increase of sixteen buffalo, with the loss of one old bull which was shot in November in order to save the head and robe, as it had become too thin to stand the winter, leaving ninety-seven buffalo in the park. When on my rounds of inspection I have seen some very fine elk, and counted twenty-two of all ages and sizes in one herd. The total number of these animals in the park is estimated at forty-seven. An increase of five fine moose calves makes a total of thirty-one moose. The mule deer are very plentiful, but there is no accurate way of counting them, and judging by the tracks all through the park we have estimated the number to be eighty.

In conclusion, I wish to express my appreciation of the ready help afforded me by yourself and other officials in carrrying on the work.

I have the honour to be, sir,

Your obedient servant,

ARCH. COXFORD,

Superintendent, Elk Island Park.

APPENDIX No. 6.

REPORT OF THE SUPERINTENDENT OF WATERTON LAKES PARK.

Waterton Mills, Alta., March 31, 1915.

Sir,—I have the honour to submit herewith my first report as superintendent of Waterton Lakes park, for the fiscal year ending March 31, 1915.

The office of superintendent for this park was not filled till my appointment in September, 1914. The work, since the setting apart of the area for park purposes in 1910, has been under the supervision of the forest ranger, Mr. J. G. Brown.

EXTENSION OF BOUNDARIES.

During the year the boundaries of the park were extended as far as the international boundary on the south and towards the Crowsnest railway on the north, the area now inclosed covering 423 square miles.

When this portion of the Rockies was first selected as a national recreational ground, the southern boundary extended from the Continental Divide six miles along the northern boundary of Glacier National park, United States, and along the British Columbia boundary for 9 miles to the northwest, giving an area of 54 square miles. When the parks were re-established under the new Act of 1911, Waterton Lakes, in common with all Dominion parks in the Rockies, suffered a reduction in area, the boundaries being cut down to include only 13·5 square miles.

In September last, however, the area was enlarged to include some 22 miles along the international boundary and touching Glacier park, Montana, and a strip of mountain country approximately 12 miles wide extending in a northwesterly direction along the British Columbia boundary to the west branch of the south fork of the Oldman river in the south Kootenay pass. This gives an area of 423 square miles of as varied and magnificent scenery as is to be found in all the Rockies.

This park is the pleasure ground for the people of the Crowsnest pass, Lethbridge, and southern Alberta districts generally.

FIRE AND GAME PROTECTION.

With the enlargement of the park area there was an addition to the staff for the protection of the forests and game. A chief fire and game warden was appointed, together with subwardens, and these men are stationed at points where they are able to keep a careful watch over the trails leading into the park. Their vigilance has very largely prevented infractions of the law with regard to the protection of game. In fact, the only infringement was that of killing a deer within the restricted area, and in this case a conviction was secured.

There was no trouble with fire during the year, due largely to the fact that no railroad touches or traverses the park; not even an incipient blaze was reported, notwithstanding the many tourists occupying tents, and cooking by open fires.

PARK IMPROVEMENTS.

During the year a boulevard of about 750 feet extending around the south shore of the beautiful bay in front of block 3, and two public reserves on the same bay were cleared of brush and dead timber, and are ready for walking and picnic parties next season.

Considerable work has been done on the wagon road leading to the park from Pincher Creek and Macleod. Rocks have been removed and holes filled up as far as the boundary of the park. The members of the Pincher Creek Automobile Club have picked rock and filled holes on the same trail outside the park limits, and have erected finger posts at all turns of the road from Pincher Creek to the camping grounds on the upper Waterton lake.

A grade was also made, and other improvements effected on the wagon road inside the park limits which leads to Cardston, Glenwood, Mountain View, and other eastern towns. It is hoped that next year a bridge over the difficult ford at Waterton Mills will be constructed, thus giving autoists of Macleod, Lethbridge, and other southern Alberta towns a good road and safe crossing to Waterton Lakes park.

Temporary living quarters have been made for the superintendent and chief warden on the upper shores of the middle Waterton lake, and repairs have been effected to make the old cabins of the forest rangers habitable for our park wardens.

We are hoping for an extension of the government telephone system from Twin Butte to connect with Waterton Lakes hotel, thus giving tourists an opportunity to reserve hotel accommodation, and make inquiries concerning the weather, etc., before coming in.

A post office in the park is a great necessity, and there is reasonable assurance that before the camping season opens this summer, a bi-weekly mail and stage service will be established from Pincher Creek.

LOTS, BUILDING, AND ACCOMMODATION.

A survey of 150 building lots, each 75 feet by 150 feet, in desirable locations on the middle and upper Waterton lakes has been made, and a large number of these have been applied for.

One new cottage was erected this year, and plans are being prepared for others to be built during the coming summer.

The large new Waterton Lakes hotel was completed in July last, giving ample dining accommodation, and providing eleven bed-rooms. These, in addition to a large number of new tents and the use of the old hotel for sleeping quarters, will give excellent service to tourists next season. In connection with the hotel there is also a dancing pavilion.

A large frame barn for livery and feed purposes has also been erected, and visitors with horses will be able to secure feed and stabling at reasonable rates. Pack and saddle ponies and light rigs may be hired for transportation to fishing and scenic points in different parts of the park, and licensed guides will be available to safely conduct parties wherever they may wish to go.

A 6-horsepower gasoline launch is busy every day making trips to the head of the upper lake, 3 miles into Glacier park, and to the excellent fishing grounds in the lower lake and Waterton river. New row-boats have been purchased for the boat livery, and lovers of water sport may be assured of the very best service this summer.

FISHING.

No better sport for the angler can be obtained anywhere in the Rockies than in the creeks throughout the park.

In the northern portion the south branch of the South Fork, and a branch recently named Castle river, Beaver, Whitney, Gladstone, and Drywood creeks, there is an abundance of speckled trout, while the Waterton river and Belly river in the south daily yield their strings of the finny tribe.

Waterton lakes, a chain of three picturesque bodies of water some 16 miles in length, Cameron, Bertha, and Beaver lakes, smaller sheets of from 1½ to 3 miles in length, are well stocked with lake trout, and afford no end of sport to the fisherman.

GRAZING AND TIMBER.

Settlers adjacent to the park express themselves as being thoroughly satisfied with the conditions under which grazing for stock and permits for timber are issued. From November 1 to the present date, stock has been allowed to graze free of charge, and many settlers have taken advantage of this concession.

TOURISTS.

The season of 1914 saw a marked increase in the number of visitors, and a freer interchange of tourists between this park and Glacier park across the boundary line.

The number of tourists in Waterton Lakes park in 1914 was approximately:—

Registered at hotel	900
Campers and visitors	1,100
Total	2,000

I have the honour to be, sir,

Your obedient servant,

ROBERT COOPER,

Superintendent, Waterton Lakes Park.

APPENDIX No. 7.

REPORT OF THE SUPERINTENDENT OF JASPER PARK.

JASPER, ALTA., March 31, 1915.

SIR,—In the absence of Lt.-Colonel Rogers, superintendent, I have the honour to submit herewith the report of the work in Jasper park for the fiscal year ending March 31, 1915. Lt.-Colonel Rogers left on August 20, 1914, for Ottawa, where he was appointed colonel in command of the 9th Battalion, Canadian Expeditionary Force. Since his departure the affairs of the park have been under my jurisdiction, subject to your direct supervision.

Owing to the unfortunate financial depression which prevailed in the early part of the year which was accentuated by the beginning of the war, a number of the enterprises connected with the growth of the park and proposed by outside capital did not mature, and the progress and improvements made on the part of the public were not very great. Some of these matters have only been temporarily postponed and will be commenced and carried to completion as soon as the financial difficulties are over.

During the past year the government expenditure has been largely concentrated in and about Jasper townsite, but at the same time, the following road, trail and bridge construction has been completed:—

A standard road was built from the townsite to the Athabaska river, about 1¼ miles in length, to connect with the drive to Maligne canyon. A branch from this road leads off to the proposed site of the Canadian Northern Railway depot.

At the Athabaska river, a temporary pile bridge was constructed, which proved a great convenience to the public, the Athabaska being dangerous and difficult to ford for three or four months each summer. During the high water, a couple of bents in the centre of the bridge were washed out, but, by using wire cables, a part of the bridge was suspended and remained in use all year. Further strengthening cables and repairs the latter part of this year have placed the bridge in such a condition that it is hoped its usefulness will remain unimpaired for some time.

The site for the permanent bridge has been selected alongside the temporary structure, and before the latter has outlived its usefulness, a steel bridge should be placed in position.

The main road leading from the Athabaska to the Maligne canyon is about half completed, and affords beautiful views of numerous small lakes. The uncompleted portion is quite passable for carriages, and numerous parties took advantage of this last summer to visit the shelter at the canyon and inspect the wonders of the canyon itself.

From Maligne canyon to Medicine lake, the trail has been improved, and on the shore of Medicine lake a new trail constructed.

From Medicine lake to Interlaken a complete new trail has been built, passing Jack lake (an unusually good fishing lake) and down the Rocky river, where the scenery is very striking. The round trip by this trail from Jasper and back is a nice short tour for those wishing to make a trail journey that is not too long.

A trail to the top of Goat mountain, 7,500 feet in height, and just across the Miette river from Jasper, has been built. A view of the whole nearby country lies beneath the eye of the tourist who makes this short climb of about three miles. The panorama,

which includes Jasper townsite, the Miette and Athabaska rivers, and lakes and mountains in every direction for 40 or 50 miles, provides a kaleidoscope of rare attraction, and makes the trip well worth taking.

From the end of the trail on the west bank of the Athabaska river some 8 miles from Jasper, a trail has been built to the foot of Geikie mountain and close to the large glacier on its northern side. Geikie is the highest point in the immediate vicinity of Jasper, rising to over 10,000 feet above the sea.

Repairs and improvements to the Pyramid Lake road make it easier to reach this ideal summer resort.

The trail from Pocahontas to the Miette hot springs has been widened and improved, a number of the worst grades eliminated, and the ride to the springs can now be done easily in two and a half hours.

These hot springs continue to receive large patronage, notwithstanding the meagre accommodation for visitors. A large number of severe cases of rheumatism are reported as having been relieved and complete cures are stated in a number of cases.

From mile 80 on the Canadian Northern railway, opposite Pocahontas, a trail has been cut up Moose creek some 15 miles, giving access to the great north country, which is full of game, also adding to the possibilities of fire protection in the park.

A short trail was cut during the summer from the old main trail through the park to the Athabaska falls. These falls are some 60 feet in height, on the Athabaska river, about 25 miles south of Jasper.

Canadian Northern Railway.—During the year the Canadian Northern railway completed laying steel through the park, and have now connected up this portion of the line with Vancouver, giving two completed transcontineutal railways crossing the widest part of the park.

Telephone System.—The inauguration of a telephone system for the use of the wardens and fire protection has been begun, and about 50 miles of it is in operation, but so far the public have not been given the privilege of subscribing. A public telephone exchange will be a matter for future development as the population increases and the warden's system will form a nucleus from which the public system can be extended.

Townsite Improvements.—All the streets in Jasper, except one block have been rough graded. The central portion has been surfaced and the boulevards and sidewalks marked out with boulders.

Forty-six lots have been taken up by the public, and buildings to the value of approximately $35,000 have been erected.

In addition to the above the Anglican church, valued at $1,000 has been erected; the Union church at $1,000, and the school house at $1,200.

Many more would have leased lots and built upon same had not the war put a stop to the work in and around Jasper.

A blacksmith shop, driving shed, and fire hall have been added to the permanent government buildings at Jasper.

The athletic grounds were very much appreciated by the public during the summer, football and baseball being indulged in. The tennis courts were also partially completed. During the winter months the Athletic Association here had a skating rink on part of the grounds.

Golf links were also located by Sir Arthur Conan Doyle, as referred to in the latter part of this report.

Park Extension and Boundaries.—The park area was extended during the year to 4,400 square miles, making it one of the largest parks in North America. This necessitated an addition to the staff of wardens, and will mean further additions in the near future.

The northern boundary of the park is at present not marked clearly, and the acting engineer has made the suggestion that a part of this boundary be defined by the Canadian Northern Western Alberta Railway right of way up Solomon creek until it diverges north of it. From that point westward a survey will have to be made and the lines cut out. At present, hunters and others are in doubt as to whether they are in the park or not.

Game in Park.—The game is reported to be increasing and becoming tamer. A number of sheep and goats are to be seen on various points on the mountain near the railway. Deer are coming down, even into the townsites. Rabbits are becoming so thick that they are a nuisance, and are destroying some of the young growth. It is expected that the disease which carries this little animal off will be prevalent shortly. Beaver are increasing rapidly. Bear and other large game are also to be seen quite frequently in the park. Good fishing is to be had in the various lakes and rivers.

Fire Protection.—During the past year the park has been fortunate in escaping serious fires, and from now on the danger should decrease every year. The increasing number of trails and the installation of a telephone system for the wardens will make the concentration of a fire-fighting force easier and quicker, and in this connection the fact that there are two completed railways running through the widest part of the park should be of considerable advantage. Also the completion of construction of the Canadian Northern railway will remove a former source of danger, the number of men employed being fewer and of a better and more permanent class.

Forestry.—This is a matter of development which might be undertaken in the future with great success, and experiments in regard to all kinds of arboriculture would, I am sure, be a distinct feature from a scenic point of view.

VISITORS.

Amongst the distinguished visitors to this park this year were Sir Arthur and Lady Conan Doyle and party. They visited a number of the points of interest and expressed themselves delighted with everything they saw. Sir Arthur kindly gave his assistance and practical knowledge to the laying out of a nine-hole golf course on a plateau overlooking Jasper townsite and close to the site of the proposed Grand Trunk Pacific hotel. Sir Arthur has had some previous experience in laying out golf links, and expressed his opinion that the Jasper Park course would be a very sporting one, combined with a situation where there were such magnificent and varied views of the mountains.

Before leaving Sir Arthur composed the following poem:—

THE ATHABASKA TRAIL.

My life is gliding downwards; it speeds swifter to the day
When it shoots the last dark canyon to the Plains of Far-away.
But while its stream is running through the years that are to be
The mighty voice of Canada will ever call to me.
I shall hear the roar of rivers where the rapids foam and tear,
I shall smell the virgin upland with its balsam-laden air,
And shall dream that I am riding down the winding, woody vale,
With the packer and the pack-horse on the Athabaska trail.

I have passed the warden cities at the eastern water-gate,
Where the hero and the martyr laid the corner stone of State,
The habitant, coureur des bois, and hardy voyageur,
Where lives a breed more strong at need to venture or endure.
I have seen the gorge of Erie, where the roaring waters run,
I have crossed the Inland Ocean, lying golden in the sun,
But the last and best and sweetest is the ride by hill and dale,
With the packer and the pack-horse on the Athabaska trail.

I'll dream again of fields of grain that stretch from sky to sky,
And little prairie hamlets, where the cars go roaring by,
Wooden hamlets as I saw them—noble cities still to be,
To girdle stately Canada with gems from sea to sea;
Mother of a mighty manhood, Land of glamour and of hope,
From the eastward sea-swept islands to the sunny western slope,
Evermore my heart is with you, evermore till life shall fail.
I'll be out with pack and packer on the Athabaska trail.

ARTHUR CONAN DOYLE.

JASPER PARK, June, 1914.

I have the honour to be, sir,

Your obedient servant,

N. C. SPARKS,

Acting Superintendent, Jasper Park.

APPENDIX No. 8.

REPORT OF ACTING SUPERINTENDENT OF REVELSTOKE PARK.

REVELSTOKE, B.C., January 15, 1915.

SIR,—I have the honour to submit herewith my first report of Revelstoke park for the fiscal year ending March 31, 1915.

For a number of years the residents of the city of Revelstoke have endeavoured to have a portion of the country to the north of the city, including mount Revelstoke and the Clach-na-coodin group of mountains, opened up and developed so that it would provide a pleasure resort for themselves, and also furnish sufficient attraction to the tourists to entice them to tarry a few days to enjoy the scenery surrounding their city.

The first effort put forth in this direction by the city was in the construction of a pony trail leading from the city to the summit of mount Revelstoke (6,150 feet). Later a small cabin or chalet was built at the top, which was equipped with stove, bunks, and a quantity of cooking utensils. During the summer months, numbers of the residents availed themselves of the opportunity of using this shelter and would often spend a week or more there enjoying the invigorating air and matchless scenery.

Others packed up tents and other camp paraphernalia in order to enjoy their outing more in the open. Needless to say numbers of exploration trips were made from the summit as a base, and the stories brought back to the city, together with the many magnificent views of the beautiful lakes, high, snow-capped mountains, and glaciers, roaring mountain streams, and flower-laden valleys and hillsides, soon attracted greater numbers. The idea was then conceived of building a motor road to the summit of mount Revelstoke.

The natural attractions of the district were sufficient to induce the Provincial Government to make a survey of the route to the summit, and later to begin construction. Some three and a half miles were opened up for traffic. In the spring of 1914 it was decided by the Dominion Government to set apart an area of approximately 100 square miles of this territory, lying between the Columbia and Illecillewaet rivers, as a new national park to be called Mount Revelstoke park.

The policy of the Parks Branch is to rush this auto road to completion, and when finished, Revelstoke park will be able to lay claim to having an auto drive attaining to

a higher altitude than any other park on the continent, if not in the world. Further, it is proposed to prepare a golf course at the summit among the many alpine meadows, thus enabling visitors to enjoy this popular pastime "above the clouds."

A short description of the route may be in order here. Leaving the Canadian Pacific Railway's depot at Revelstoke, we proceed westward through the city for about a mile, then turn north on to the "Big Bend" wagon road. This road is followed for about one and one-quarter miles, and then a turn eastward is made into the auto road ascending mount Revelstoke. Owing to the topography of the country the road switchbacks east and west behind the city, rising from one bench to another until an elevation of approximately 4,500 feet is reached. Then a long tangent is run to the eastern or Illecillewaet slope, after which the route turns northwesterly to the summit.

The first portion of the route, after leaving the city almost parallels the Columbia river, and passes through good agricultural and fruit-raising country, but on leaving the wagon road it begins to gradually climb the benches, which are clothed with young forests of pine, spruce, cedar, fir, and numerous other varieties of forest trees. Looking below us to the west we see the two large bridges spanning the Columbia river—one a steel structure, the railway bridge—the other a wooden one, the traffic bridge—to the many ranches and orchards on the west side of the river. We also see the railway winding westward through Eagle pass in the Gold range, while farther to the northwest the heavily timbered slopes of Jordan pass are seen with many towering, snow-capped peaks rising far beyond.

As higher levels are reached, mount McArthur (8,364 feet) comes plainly into view to the southwest, while farther south the massive form of mount Begbie (8,946 feet) will be seen, with an immense glacier clinging to its northwest slope.

On proceeding farther eastward, a beautiful panorama of the city of Revelstoke and the many surrounding orchards and farms can be seen, together with the broad expanse of the Columbia river, whose tortuous course can be traced almost to where it empties into Upper Arrow lake at Arrowhead. To the southeast rise mount McKenzie (8,064 feet) and mount Cartier (8,662 feet); a climb to the summit of McKenzie from the railway is only 50 feet short of that from Glacier House to the summit of Sir Donald, while to the summit of mount Cartier exceeds that to Sir Donald by about 550 feet.

Continuing to the summit of mount Revelstoke the view is extended in all directions. Far below the Illecillewaet river winds between the massive peaks to the east and west—its volume swelled by Greely creek which drains the valley between mount Albert (9,998 feet) and mount McKenzie, and Twin creeks coming from the glaciers and snowfields of the two Albert peaks.

From the southerly slopes of the Clach-na-coodin mountains a stream of the same name drains a number of lakes high up on the mountain side, and is fed by the snow and ice from this group, a number of whose peaks are nearly 8,000 feet high.

Immediately surrounding us on the summit are many large upland meadows interspersed with many small lakes. The variegated colouring of these meadows and adjacent hill-sides, on account of the abundance of wild flowers, is beyond description. Violets, daisies, lilies, marigolds, lupins, and heather grow in such profusion that the meadows are veritable flower gardens.

Near the summit is a large rift in the formation, which has been named the "Ice Box." This cleft in the solid rock is about 100 feet long and 20 feet wide, and even in September there are from 15 to 20 feet of snow and ice in the cave.

By crossing a small valley between mount Revelstoke in a northerly direction going toward the Clach-na-coodin group, three pretty lakes, of a beautiful translucent emerald colour are to be found—Millar, Eva, and Ella—all easy of access by pony trail, and all well worthy of the trip.

Within the park is to be found an abundance of fish and game. Several species of grouse are plentiful on the mountains, while bear, deer, and caribou are often seen.

The past summer, caribou were seen in the meadows hob-nobbing with the saddle ponies while out at pasture. In the streams—particularly Silver creek, Greely creek, and the Illecillewaet river—are to be found rainbow or cut-throat trout in abundance, while in the Columbia the larger "Dolly Varden" species are often secured weighing from 10 to 20 pounds.

Operations on the construction of the automobile road were started during the second week in July, at which time orders were placed for the necessary tools, road-making machinery, explosives, and boarding camp equipment. Upon these being received, work was pushed along vigorously by a large force of men and several teams, so that when funds were exhausted several weeks later, 2 miles of new road, with necessary bridges, culverts, and cribbing complete had been opened for traffic, and an additional 2 miles had been opened up on which the rock work, cribbing, and bridges were about half completed. About 12,000 cubic yards of rock and earth were removed, and in the construction of bridges about 23,000 lineal feet of round timber were used. Sufficient good material is found on the ground for all such work, but plank has to be purchased for decking for several larger bridges yet to be constructed. With sufficient funds available this coming season the remainder of the road should be opened to the summit before the fall.

With the completion of the present programme of automobile road construction, preparing of golf course, and erection of small chalet at the summit, the opening up of good pony trails to the many points of interest and making these easy of access for the tourist, the city of Revelstoke will be in a position to offer inducements to the traveller which few cities in Canada can furnish. Revelstoke park provides the sight-seer sufficient variety to satisfy the most exacting. The botanist can find ample scope for investigation among the flora, the mountain-climber numbers of trying climbs to test his mettle, while the hunter or fisherman can readily be outfitted with guides, ponies, provisions, etc., for his outing in the solitudes in quest of big game outside the limits of the park. In fact, the natural advantages of the situation of this park provide each and all classes of pleasure seekers with an excellent outfitting base from which the numerous attractions are easily accessible. With sufficient publicity given, this park should in the near future attract large numbers of visitors who would otherwise pass on to other points.

I would suggest that a survey line be run around the park, and this line cut out, so that the wardens can locate the boundaries, as this would assist very materially in the administration of the parks regulations in connection with game and timber.

Your obedient servant,

F. E. MAUNDER,

Acting Superintendent, Revelstoke Park.

REPORT OF THE ST. LAWRENCE ISLAND PARKS.

These parks comprise the only areas in Ontario administered by the Dominion Government as national recreation grounds, and they serve as an excellent example to show the necessity and value of setting aside such areas at suitable places all over the Dominion. They consist of twelve islands, or parts of islands, and one reservation on the mainland, in all having an area of approximately 140 acres, situated for the most part between the towns of Brockville and Gananoque among the Thousand Islands. Owing to the popularity of the Thousand Islands as a summer resort, most of the serviceable lands in the vicinity are privately owned, and although they are not all occupied, most of them display the sign "Private Grounds" or "Trespassing Not Allowed," and if it were not for these parks, casual picnickers, launch parties, or

campers would have no place where they could land except through the kindness of private owners. A trip up the St. Lawrence river during the holiday season will show the daily use that is made of these grounds by hundreds of people.

Each island, or group of islands, as the case may be, is a complete park or recreation ground, and is supplied with a wharf for skiffs and launches, as well as all the equipment necessary for a picnic or camping party, including pavilion, tables, benches, camp stoves, garbage receptacles, closets, etc. Flag poles have been erected near the pavilions from which a Union Jack is always flying and this, with the sign board "Dominion Lands No. 3," or whatever may be the number which designates the particular reservation, indicates the presence of a Dominion park.

Most of the parks have numerous shade trees, and on several of the larger islands, suitable areas have been cleared for large picnics. Each park is in charge of a caretaker, who keeps it neat and clean and enforces the few necessary regulations. All the privileges of the parks are free to any one who desires to visit them, provided the regulations are carefully observed.

Considerable work in connection with these parks was done during the year, as follows:—

Stovin Island.—A new skiff and launch wharf was built in the small sheltered bay south of the island to accommodate the increased demand for wharf room.

Mallorytown Landing.—The wharf at this park had become unsafe and required almost an entire new covering. A playground consisting of about 2 acres was levelled off here and seeded, affording a very suitable place for school picnics.

Grenadier Island.—At this park the old wharf was in need of extensive repairs, but owing to the strong current at this point and the consequent strain, it was decided to repair only a small portion and to build a new wharf in a less exposed position. The old wharf was accordingly re-covered and the piers filled in with stone and a new wharf, 80 feet long, built at the northwest corner of the island in a sheltered channel.

Georgina Island.—Some clearing was done here and an experiment made with rustic cobblestone chimneys for the camp stoves. These chimneys harmonize with the surroundings, and, if they prove satisfactory, the present ordinary stove chimneys, which are constantly in need of repair, and frequently blow down, will be gradually replaced by the more permanent cobblestone kind.

Beau Rivage Island.—A new cement wharf, large enough to accommodate the average river steamers, was built on this island by the Department of Public Works.

In addition to the above improvements there were numerous small renewals and repairs to the pavilions.

BANFF IN WINTER FOR THE AMATEUR ASTRONOMER.

The winter constellations are particularly interesting, viewed from Banff, surrounded as they are by mountains which concentrate a limited canopy overhead, and with the peaks forming ready pointers for the location of the different constellations.

For instance, what can be more beautiful in the beginning of the new year than the magnificent Sirius (the sailor's dog star) apparently just over the northernmost peak of mount Rundle. This luminary, scintillating and flashing in different colours like a magnified precious brilliant, is the most conspicuous as well as one of the nearest fixed stars, although it is one-half million times farther away than we are from the sun. A little to the southeast, right over the highest peaks of mount Rundle, are three bright stars close together, known as Orion's Belt, and forming a dividing line between the ruddy star Rigel to the south. A little further up the sky to the

west is the orange-coloured star, Aldebaran (Arabic for Devil), forming the eye of the bull in constellation Taurus. About as far again up the sky is the little group of stars known as the constellation Pleiades. Ordinarily, at lower altitudes, six stars only can be seen without glasses, but at the altitude of Banff, nine are visible. In the early evening, say eight o'clock, Banff time, when the constellations are in the positions above mentioned, immediately over Tunnel mountain to the east will be noticed two stars close together—they are really about 5 degrees apart—and one above the other. These are the twins, Castor and Pollux, with the star cluster of Præsepe in Cancer lower down, and the bright yellow star Capella farther up the sky.

Setting in the northwest over Sawback range is the great cross of Cygnus, whose mighty arms stretch right across the Milky Way. Just below the northern arm, and close to the top of mount Edith, may be seen the blue star Vega. This star is of special interest as the sun, with its retinue of planets, is travelling in that direction at the rate of 12 miles per second, and she is coming towards us at 10 miles per second. In 12,000 years Vega will be the north star, and a magnificent object she will be. If the sun and Vega were now to change places, we should have one hundred times more light than at present.

Topping Cascade mountain, the highest peak of which is 1 mile above the town of Banff, is the pole star, with the pointers of the dipper in Ursa Major over Bankhead.

Sulphur mountain, at the time of writing, points to Jupiter, the mightiest of all the planets setting on the western slope. And over Goat mountain, to the south and east, can be seen the sickle-shaped array of stars forming the constellation Leo, with the bright star Regulus at the end of the sickle handle.

On the western horizon, where the dark outline of mount Massive and the profile of the "Iron Duke" are just visible, may be seen the constellation of the Whale and, portrayed by the converging point of Pisces, the variable star Mira, whose irregularities are such that at certain times it is quite brilliant and at others invisible.

At the zenith right overhead is the great star cluster in Perseus, with the famous nebula of Andromeda a little farther to the northwest.

It is within the range of possibility that a small observatory may be built in Banff, at an easily accessible site, and an astronomical telescope installed. This, with the prospect of Banff becoming a favourite winter resort, would add considerably to the already numerous attractions and render possible an appreciable insight into the immensity and grandeur of the heavens.

J. T. CHILD,

M. Can. Soc. C.E.

Banff, Alberta.

SESSIONAL PAPER No. 25

METEOROLOGICAL TABLES.

MAXIMUM AND MINIMUM TEMPERATURES and the General State of the Weather between April 1, 1914, and March 31, 1915, at *Banff*, Rocky Mountains Park.

Date.	THERMOMETER READINGS		Weather, etc.
	Maximum for day.	Minimum for day.	
1914.			
April 1	38·2	8·2	Fair; fine day.
" 2	38·8	15·0	Cloudy; fine dny; snow on grouud 0 to 7 inches.
" 3	47·3	29·7	Cloudy; solar halo; thaws much.
" 4	49·8	25·0	Fair; very fine mild day; main road dusty in places.
" 5	39·3	33·5	Cloudy; rain; snow flurries; all Zoo bear now out.
" 6	36·9	31·8	Overcast; Bow river open to above boathouse.
" 7	45·8	24·0	Fair; by afternoon main road dry and snow gone.
" 8	46·3	26·2	Fair; snow flurries evening, and very light rain.
" 9	45·2	29·4	Cloudy; light snow early a.m.; Bow river open to Forty Mile creek.
" 10	51·3	29·8	Fair; perfect day; Bow river open; afternoon boating, golf.
" 11	56·0	27·6	Fair; very fine day and night; Prairie Anemone 1st in flower.
" 12	54·1	32·0	Fair; very fine day.
" 13	52·1	34·6	Fair; strong wind afternoon, SW.
" 14	51·2	36·9	Fair; fine day; watering main road.
" 15	51·2	37·6	Cloudy; light rain.
" 16	50·0	32·8	Fair; light rain a.m.; very few patches of snow.
" 17	45·4	31·7	Fair; snow flurries; all roads mostly dry.
" 18	49·0	27·8	Cloudy; strong wind, SW.
" 19	46·0	36·0	Cloudy; heavy rain; fresh snow on mountains.
" 20	33·9	28·2	Cloudy; heavy snowfall about 13 inches; very bad walking.
" 21	44·0	9·0	Fair; perfect day overhead; slushy and muddy.
" 22	49·8	16·8	Fair; fine day; snow in patches.
" 23	56·0	30·2	Fair; few patches of snow.
" 24	47·3	33·7	Cloudy; light rain and soft hail.
" 25	47·2	27·2	Fair; soft hail flurries; many mallard duck.
" 26	48·0	21·9	Fair.
" 27	50·2	26·9	Fair; snow flurries and very light rain every few minutes.
" 28	52·3	32·8	Cloudy; fine day; Zoo Marmots out.
" 29	62·1	29·2	Fair; very fine day.
" 30	65·0	30·9	Fair; very fine day.
May 1	65·9	31·7	Fair; very fine warm day.
" 2	60·2	42·2	Fair; rain.
" 3	40·2	35·3	Cloudy; rain; light snow; river bed nearly covered.
" 4	45·8	32·3	Fair.
" 5	47·0	23·9	Fair.
" 6	48·8	24·7	Cloudy; cool day.
" 7	60·1	23·2	Fair; very fine day.
" 8	63·2	29·9	Fair; fine day.
" 9	48·0	37·2	Overcast; very heavy rain; fresh snow higher slopes of mountains.
" 10	49·0	37·6	Cloudy; rain early a.m.; fresh drying wind.
" 11	55·8	32·0	Fair; very light rain; fine day.
" 12	60·2	28·9	Fair; fine day.
" 13	61·0	30·2	Fair; fine day.
" 14	70·1	31·2	Fair; very fine day.
" 15	59·3	40·8	Cloudy; heavy rain.
" 16	59·2	32·9	Fair; Lake Minnewauka all open.
" 17	59·0	27·3	Fair.
" 18	54·2	31·1	Fair; rain; thunder.
" 19	54·6	33·6	Fair; light rain.
" 20	54·0	34·3	Cloudy.
" 21	55·2	28·0	Fair.
" 22	57·8	33·9	Fair.
" 23	64·8	34·9	Fair; aroma from fir trees, etc., in air.
" 24	66·8	34·9	Fair; very fine day.
" 25	56·1	39·9	Cloudy; rain; gale.
" 26	52·0	37·2	Cloudy; light snow flurries a.m.
" 27	52·2	30·9	Cloudy; rain; very light snow.
" 28	49·3	32·2	Fair; light snow.
" 29	60·1	37·8	Fair; very light rain.
" 30	68·3	39·0	Fair; perfect day; about 18 plants in flower and 3 bushes.
" 31	77·3	30·0	Fair; perfect day; black ants numerous, flying.

METEOROLOGICAL TABLES—Continued.

Maximum and Minimum Temperatures and the General State of the Weather between April 1, 1914, and March 31, 1915.—*Continued.*

Date.	Thermometer Readings		Weather, etc.
	Maximum for day.	Minimum for day.	
1914.			
June 1	73·8	32·7	Fair; very fine day and night.
" 2	79·3	37·2	Fair; very fine day.
" 3	73·3	45·6	Fair; very fine day.
" 4	54·5	47·3	Cloudy; rain.
" 5	51·2	39·2	Cloudy; rain.
" 6	48·7	41·8	Overcast; rain; cool; clouds low on mountains.
" 7	56·3	33·9	Fair; fresh snow on mountains; cool wind.
" 8	52·0	42·9	Cloudy; cool.
" 9	56·1	41·0	Cloudy.
" 10	64·2	40·8	Fair; trace of rain.
" 11	59·3	42·7	Cloudy; light rain.
" 12	63·0	38·0	Fair; rain during night; fine day.
" 13	65·4	45·2	Fair; light rain; fine day.
" 14	76·3	37·0	Fair; very fine day.
" 15	79·2	40·2	Fair; very fine day.
" 16	78·5	42·0	Fair; very fine day.
" 17	76·2	44·8	Fair; very fine day; 25 mile wind afternoon, W.
" 18	76·0	47·0	Fair; fine day.
" 19	69·1	43·2	Fair; very fine.
" 20	64·2	44·9	Cloudy; very light rain.
" 21	48·5	35·2	Cloudy; rain; some hail; 20 mile wind SW; gale during night.
" 22	46·4	36·3	Cloudy; trace of rain; 22 mile wind S.W.; chilly day.
" 23	60·9	39·8	Cloudy; rain evening and through midnight.
" 24	60·9	38·8	Fair; rain evening and through midnight.
" 25	45·2	38·3	Overcast; rain.
" 26	63·2	36·2	Fair.
" 27	65·0	39·3	Fair; rain 30 minutes; fine day.
" 28	65·2	37·2	Fair; light rain evening; fine day.
" 29	70·2	39·3	Fair; very fine day.
" 30	77·4	40·6	Fair; very fine day and night.
July 1	81·1	40·2	Fair; very fine day.
" 2	83·3	44·2	Fair; very fine day and night.
" 3	84·3	43·8	Fair; very light rain; thunder.
" 4	70·5	47·2	Cloudy; rain; thunder; and lightning.
" 5	66·1	50·8	Cloudy; rain; thunder and lightning.
" 6	73·3	45·3	Fair; very heavy rain 5 a.m. over before 6 a.m.; roads dry and dusty in places by afternoon; very fine day.
" 7	76·1	42·6	Fair; very fine day; cool wind.
" 8	77·9	54·8	Fair; 20 mile wind S.W. dry; very fine day and night.
" 9	82·1	43·2	Fair; very fine day.
" 10	82·3	41·3	Fair; very fine day and night.
" 11	85·7	45·2	Fair; very fine day.
" 12	85·2	52·9	Fair; rain; thunder and lightning; very fine to 5 p.m.
" 13	69·2	49·2	Fair; rain.
" 14	69·5	52·0	Cloudy; very light rain off and on.
" 15	62·0	46·7	Fair; rain.
" 16	71·2	34·0	Fair; very fine day.
" 17	77·0	40·0	Fair.
" 18	81·0	41·5	Fair; very fine.
" 19	85·8	46·0	Fair.
" 20	65·0	49·8	Cloudy; rain; thunder.
" 21	56·8	40·0	Cloudy; 25 mile mind West; fresh snow on mountains.
" 22	67·5	52·0	Fair.
" 23	73·5	41·0	Fair; rain; meteor.
" 24	74·8	40·2	Fair.
" 25	71·0	43·5	Fair.
" 26	73·0	42·5	Fair; very fine day.
" 27	80·5	40·2	Fair; very fine day.
" 28	77·2	49·8	Fair; perfect day.
" 29	79·8	43·0	Fair; perfect day.
" 30	87·8	37·2	Fair; fine day.
" 31	90·0	47·0	Fair; fine day; very hot; very light rain.

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METEOROLOGICAL TABLES—Continued.

Maximum and Minimum Temperatures and the General State of the Weather between April 1, 1914 and March 31, 1915.—*Con.*

Date.	Thermometer Readings		Weather, etc.
	Maximum. for day.	Minimum for day.	
1914			
Aug. 1	89·0	44·5	Fair; fine; very hot.
" 2	88·0	39·9	Fair; very warm; cloudless sky; light breeze.
" 3	87·9	41·8	Fair; very light rain.
" 4	69·0	48·9	Cloudy; 20 mile wind S.W. fine afternoon; cool breeze.
" 5	80·9	38·0	Fair; perfect day.
" 6	76·8	41·7	Cloudy; rain evening and through midnight; cool breeze; fine day.
" 7	61·5	45·8	Cloudy; light rain early a.m.
" 8	62·0	42·0	Fair; fresh snow on mountains.
" 9	60·0	45·0	Cloudy; rain.
" 10	69·2	40·0	Fair; fine day.
" 11	72·2	38·0	Fair; fine and bright.
" 12	70·0	50·8	Fair.
" 13	80·9	37·7	Fair; very fine day.
" 14	81·0	38·9	Fair; very fine day; smoke from forest fire.
" 15	80·1	38·2	Fair.
" 16	64·6	44·2	Cloudy; rain; thunder and lightning.
" 17	61·1	41·0	Cloudy.
" 18	74·1	37·2	Fair.
" 19	74·3	42·3	Fair; very fine day.
" 20	76·3	36·5	Fair; evening trace of rain; perfect day.
" 21	76·3	41·0	Fair; rain; thunder and lightning.
" 22	65·4	41·9	Fair; light rain.
" 23	63·8	35·2	Fair; rain.
" 24	64·0	38·6	Fair; very fine day.
" 25	72·0	31·8	Fair; very fine day.
" 26	77·2	39·6	Fair; perfect day.
" 27	73·5	38·8	Fair; very fine day.
" 28	75·0	48·7	Fair; fine day.
" 29	78·0	37·8	Fair.
" 30	62·0	43·0	Fair.
" 31	62·3	28·0	Fair; fine day.
Sept. 1	72·2	28·1	Fair; perfect day.
" 2	75·1	32·5	Fair; perfect day, outside of smoke.
" 3	75·9	35·0	Fair; very fine day, but smoky.
" 4	66·0	46·9	Cloudy; rain; smoky part of a.m.
" 5	55·9	43·7	Cloudy; cool.
" 6	69·2	31·4	Fair; perfect day.
" 7	52·3	40·8	Cloudy; rain; 35 mile wind, NE.
" 8	53·1	40·2	Cloudy; rain; fresh snow on higher mountains.
" 9	54·2	39·0	Cloudy; up to 35 mile wind, SW.; fresh snow on mountains.
" 10	59·3	47·2	Fair; 40 mile wind, SW.; fresh snow disappearing on mountains.
" 11	40·1	33·1	Overcast; rain; and snow; 3 inches snow on ground.
" 12	43·8	32·0	Cloudy; snow disappearing and drying up quickly.
" 13	50·2	30·4	Fair.
" 14	43·2	32·0	Cloudy; rain and snow.
" 15	36·4	31·0	Overcast; snow.
" 16	43·3	30·2	Cloudy; rain during night.
" 17	50·6	33·4	Cloudy; rain.
" 18	62·9	39·2	Cloudy; rain.
" 19	52·0	37·5	Cloudy; rain.
" 20	54·7	31·3	Fair; trace of rain; fine day.
" 21	50·1	32·2	Cloudy.
" 22	58·1	33·2	Fair; fine day.
" 23	65·5	32·3	Fair; perfect day; aurora; Delevan's Comet visible.
" 24	69·1	33·9	Fair; perfect day.
" 25	71·2	35·7	Fair; perfect day.
" 26	62·3	39·3	Cloudy; rain; thunderstorm.
" 27	51·4	40·3	Cloudy; very light rain; 25 mile wind, SW.
" 28	57·2	41·0	Fair; fine day.
" 29	64·5	44·0	Fair; very fine day.
" 30	65·5	30·8	Fair; very fine day.

METEOROLOGICAL TABLES—Continued.

Maximum and Minimum Temperatures and the General State of the Weather between April 1, 1914, and March 31, 1915.—*Continued.*

Date.	Thermometer Readings		Weather, etc.
	Maximum for day.	Minimum for day.	
1914.			
Oct. 1	48·2	34·6	Cloudy; rain; gale before 6 a.m. for short time.
" 2	50·8	37·7	Cloudy; rain; fresh snow on mountains.
" 3	35·0	30·6	Overcast; snow; chilly; wet; disagreeable day.
" 4	42·2	31·5	Cloudy.
" 5	39·8	35·3	Overcast; rain.
" 6	51·1	31·3	Fair; perfect day.
" 7	42·5	33·0	Cloudy; rain.
" 8	42·1	37·7	Cloudy; rain; very fine cloud effect west.
" 9	49·6	35·1	Cloudy.
" 10	37·2	31·6	Cloudy; trace of rain.
" 11	39·1	28·1	Cloudy.
" 12	47·2	24·4	Fair.
" 13	60·1	39·2	Fair; very fine day; leaves mostly off poplars.
" 14	65·0	41·2	Fair; perfect day.
" 15	66·7	33·2	Fair; very fine warm day.
" 16	65·8	36·5	Fair; fine day.
" 17	57·0	40·9	Fair; rain; 30 mile wind, SW.
" 18	49·4	35·2	Fair; very light rain.
" 19	46·4	34·9	Cloudy; light rain and snow.
" 20	46·1	31·0	Fair.
" 21	43·8	23·2	Fair; very fine day.
" 22	45·3	21·8	Fair; perfect day.
" 23	50·7	22·8	Fair; very fine day.
" 24	56·8	30·0	Fair; very fine day.
" 25	47·2	27·3	Fair; very fine day.
" 26	53·3	27·8	Fair; very fine sunset; very fine day.
" 27	55·5	28·0	Fair; very fine day; aurora.
" 28	54·0	27·0	Fair; very fine day; aurora.
" 29	54·1	28·8	Fair; very fine day.
" 30	54·0	38·8	Fair; rain.
" 31	46·2	37·7	Fair; rain early a.m.
Nov. 1	42·3	33·8	Cloudy; rain.
" 2	41·2	32·7	Cloudy; snow.
" 3	37·2	29·2	Fair; snow early a.m.; snow going rapidly.
" 4	35·5	24·4	Cloudy; snow; light rain; snowbirds.
" 5	28·3	25·3	Overcast; snow to near midnight; first sleighing.
" 6	32·3	20·8	Fair; 11½ inches of snow on ground a.m.
" 7	35·2	11·8	Fair; start of a Chinook wind.
" 8	46·1	31·8	Fair; rain during night; 30 mile wind, SW., Chinook; sleighing bad; much snow goes.
" 9	37·6	27·8	Fair; light snow early a.m.
" 10	33·8	27·3	Cloudy; snow during night.
" 11	39·4	29·3	Fair; thaw; fine day.
" 12	31·3	22·7	Cloudy; light snow early a.m. and heavier snow during night.
" 13	19·8	13·8	Cloudy; snow and light snow during night; good sleighing.
" 14	16·5	4·9	Cloudy; wild geese flying south during night of 12th.
" 15	12·3	− 8·9	Fair; Bow river frozen above boat-house.
" 16	14·0	−15·1	Cloudy; very large solar halo.
" 17	25·8	12·3	Fair; grand sunset after glow.
" 18	25·9	13·5	Fair; gale 40 mile, west; fine sunrise; snow drifting.
" 19	32·2	18·9	Cloudy; skating on Bow river.
" 20	39·9	29·6	Fair; very large solar halo; thaw.
" 21	39·5	26·2	Fair; thaw.
" 22	42·8	28·2	Fair; gale 45 to 55 miles SW.
" 23	38·0	31·1	Cloudy; 25 mile wind, SW.
" 24	48·3	35·9	Fair; sleighing bad; Bow river opening; gale 40 mile wind SW.
" 25	48·3	40·2	Cloudy; rain with snow during night; gale 60 miles S.W.
" 26	39·2	25·3	Cloudy; Bow river open little above boat house.
" 27	42·0	28·0	Fair; very fine; mostly calm mild day; snow on ground 0 to 4 in
" 28	39·3	29·9	Fair; soft hail; from 22nd to 25th chinooking with low humidity.
" 29	31·2	21·1	Cloudy; trace of snow.
" 30	23·8	12·8	Fair; fine mostly calm bright day.

METEOROLOGICAL TABLES—Continued.

Maximum and Minimum Temperatures and the General State of the Weather between April 1, 1914, and March 31, 1915.—*Continued.*

Date.	Thermometer Readings		Weather, etc.
	Maximum for day.	Minimum for day.	
1914.			
Dec. 1.....	28·0	6·2	Fair.
" 2.....	27·9	18·3	Fair; fine day and night.
" 3.....	26·9	15·0	Cloudy; light snow; skating again.
" 4.....	18·4	6·0	Fair; fine, clear, calm day.
" 5.....	17·2	3·6	Fair; light snow; afternoon clear, calm, cold.
" 6.....	23·1	3·8	Fair.
" 7.....	7·2	−5·3	Cloudy; trace of snow.
" 8.....	11·3	1·1	Fair.
" 9.....	9·9	−10·6	Fair; calm; clear; cold.
" 10.....	7·9	−13·2	Fair; calm; clear; cold; Lake Minnewanka frozen over.
" 11.....	1·7	−17·5	Fair; calm; clear; cold.
" 12.....	5·7	−14·2	Fair; calm; clear; cold; much slush ice and anchor ice in Spray river past week.
" 13.....	15·0	− 6·0	Fair; clear; fine day.
" 14.....	4·9	− 9·2	Fair; calm; clear; cold.
" 15.....	6·0	−18·1	Fair; calm; clear; cold; ice jam Spray river.
" 16.....	9·2	−12·5	Fair; Lake Minnewanka ice 9 inches thick; clear sky.
" 17.....	8·5	−1·7	Fair; 20 mile wind SW. Spray river more jammed with ice.
" 18.....	10·0	−11·1	Fair; bright; cold.
" 19.....	7·6	− 6·8	Fair; fine; clear; calm.
" 20.....	15·0	− 8·9	Fair; fine; milder day.
" 21.....	19·3	8·8	Cloudy; trace of snow.
" 22.....	25·2	12·9	Cloudy; 20 mile wind SW.; solar halo.
" 23.....	30·9	21·9	Cloudy; Spray river very much blocked with ice.
" 24.....	24·3	14·2	Fair; very fine day.
" 25.....	24·2	9·2	Overcast; light snow day and heavier during night.
" 26.....	21·3	0·2	Cloudy; ice on Bow river 18 inches thick.
" 27.....	24·0	4·7	Cloudy.
" 28.....	21·9	10·9	Fair; fine day.
" 29.....	20·0	3·2	Fair; light snow early a.m.
" 30.....	27·3	13·2	Fair; light snow during night; fine mild light winds.
" 31.....	31·2	23·2	Fair; very fine day; ice on Bow river 20 inches thick; sleighing bad all month with 0 to 5 inches of snow on ground.
1915			
Jan. 1.....	30·0	10·8	Cloudy; very fine sunrise; snow flurries.
" 2.....	33·2	26·0	Cloudy; 30 mile wind SW.; fine sunrise.
" 3.....	37·4	26·9	Fair; snow during night.
" 4.....	26·3	16·8	Fair; snow morning.
" 5.....	16·0	− 3·6	Fair; mostly calm; clear; perfect day; sleighing good again.
" 6.....	18·7	− 3·1	Fair; 25 mile wind SW.; snow drifting.
" 7.....	27·3	9·9	Cloudy.
" 8.....	27·7	18·9	Cloudy; trace of snow; fine night.
" 9.....	31·7	22·1	Cloudy; light snow.
" 10.....	29·0	17·1	Fair; 35 mile wind SW. gale; snow drifting.
" 11.....	34·1	24·2	Fair.
" 12.....	31·2	19·8	Cloudy; trace of snow; Bow river ice as cut 24 inches.
" 13.....	18·9	0·2	Fair; fine and bright; sleighing bad 12th.
" 14.....	21·9	2·7	Fair; very fine day.
" 15.....	18·0	2·2	Fair; light snow; fine day.
" 16.....	23·0	1·0	Cloudy; 25 mile wind SW.
" 17.....	31·2	16·9	Fair; 25 mile wind W.; chilly.
" 18.....	32·9	22·8	Cloudy; 25 mile wind W.; chilly.
" 19.....	34·0	23·2	Cloudy; 30 mile wind SW.; mild; fine day.
" 20.....	26·4	14·8	Cloudy; snow; 7 to 12 inches snow on ground.
" 21.....	5·7	−14·0	Fair; very fine sunset.
" 22.....	17·2	−12·2	Fair; 25 mile wind W.; chilly.
" 23.....	18·2	7·9	Cloudy; light snow during night; very fine sunset; ice on Bow river as cut 23½ to 25 inches.
" 24.....	10·0	−12·0	Fair; very large solar halo; chilly.
" 25.....	18·2	4·0	Cloudy; snow; 25 mile wind NE.; snow drifting.

METEOROLOGICAL TABLES—Continued.

Maximum and Minimum Temperatures and the General State of the Weather between April 1, 1914, and March 31, 1915.—*Continued.*

Date.	Thermometer Readings		Weather, etc.
	Maximum for day.	Minimum for day.	
1915.			
Jan. 26	2·2	−13·2	Cloudy; light snow; snow drifting a.m.
" 27	14·9	−19·9	Fair; gale 32 mile wind SW.; bright; cold.
" 28	19·0	− 5·2	Fair; very fine day.
" 29	27·2	− 6·4	Fair; perfect day.
" 30	25·3	− 4·2	Fair; perfect day Bow river ice 27 inches.
" 31	34·3	6·3	Cloudy; fine day; 5·50 to 10·50 inches snow on ground; 20 mile wind SW. The 27th coldest day of winter.
Feb. 1	32·3	18·9	Cloudy; light snow; very fine sunrise.
" 2	26·9	4·4	Fair; snow during night; very fine day; solar halo.
" 3	30·3	20·3	Cloudy; snow a.m.; mild.
" 4	32·2	12·8	Cloudy; trace of snow.
" 5	27·9	13·0	Cloudy; fine day.
" 6	36·0	15·1	Fair; very fine and mild; sap running in aspens.
" 7	40·0	9·1	Fair; perfect day; thaw.
" 8	40·9	10·9	Fair; very fine and mild.
" 9	37·0	17·0	Cloudy; very fine and mild; clear night.
" 10	36·3	12·3	Fair; very fine, mild day; fine night.
" 11	37·1	15·3	Fair; very fine day.
" 12	35·7	3·2	Fair; fine day; ice on Bow river 27 inches.
" 13	25·0	18·8	Cloudy; snow; gale 8 a.m. about 1 hour.
" 14	25·1	−8·5	Fair; gale 35 mile wind S.W.
" 15	34·1	17·2	Fair; 20 mile wind S.W.; chilly.
" 16	40·2	14·8	Fair; 25 mile wind S.W. Chinook.
" 17	43·0	34·0	Cloudy; snow during night; thaw; gale during night.
" 18	30·8	17·1	Cloudy; snow flurries.
" 19	29·2	10·4	Cloudy; snow light a.m. and evening; chilly; N.E. wind 5 p.m.
" 20	27·2	18·7	Cloudy; 7·50 to 13·50 inches snow on ground.
" 21	30·2	−5·8	Fair; perfect day.
" 22	38·6	2·0	Fair; chilly wind.
" 23	37·5	14·0	Fair; fine day.
" 24	37·3	3·2	Fair; fine day; very fine sunrise glow.
" 25	40·0	7·1	Fair; trace of snow during night; large lunar halo.
" 26	38·3	13·3	Cloudy; very fine night.
" 27	37·3	18·1	Fair; very fine day.
" 28	36·0	7·2	Fair; very large solar halo. Bow river ice 28 inches; 3 to 12 inches snow on ground.
Mar. 1	39·2	17·2	Fair; sleighing bad in places; very fine day.
" 2	35·2	4·2	Cloudy; sleighing still good on sheltered roads.
" 3	38·0	5·3	Fair; sleighing bad north side of Bow river.
" 4	38·3	13·9	Cloudy; solar halo.
" 5	40·7	23·2	Cloudy.
" 6	39·8	12·1	Fair; perfect day; snow on ground 0 to 9 inches.
" 7	41·1	7·2	Fair; perfect day.
" 8	42·9	11·5	Fair; very fine day; very large solar halo; aurora.
" 9	42·3	8·2	Fair; perfect day; sleighing only on south side of Bow River.
" 10	43·3	18·8	Fair; very fine; mild; thaws much.
" 11	41·6	19·7	Fair; very light snow.
" 12	40·3	12·9	Fair; fine day.
" 13	42·3	17·3	Cloudy; main road dry in places.
" 14	44·3	26·2	Cloudy; thaws much.
" 15	45·7	36·5	Cloudy; thaws very much; very light rain; western robin.
" 16	47·0	29·5	Fair; fine day.
" 17	53·8	29·5	Fair; fine day; main road dry.
" 18	51·6	33·3	Cloudy; Spray river opens up above bridge.
" 19	51·0	27·8	Fair; Spray river channel all open; Bow river channel open from boat house to below falls; very fine day.
" 20	57·1	24·9	Fair; perfect day; main road dry and dusty; few butterflies about.
" 21	61·3	26·1	Fair; very fine day; snow on ground 0 to patches; duck.
" 22	61·0	30·3	Fair; very fine afternoon; very large solar halo.
" 23	35·7	30·8	Cloudy; light snowfall; raw day; wind N.E. light. Bow river open to Forty-mile Creek.

METEOROLOGICAL TABLES—Continued.

Maximum and Minimum Temperatures and the General State of the Weather between April 1, 1914, and March 31, 1915.—*Continued.*

Date.	Thermometer Readings		Weather, etc.
	Maximum for day.	Minimum for day.	
1915.			
Mar. 24.....	30·8	23·3	Cloudy; snow.
" 25.....	23·9	8·0	Fair; bright; cold; northerly wind.
" 26.....	42·2	−0·1	Fair; fine day; clear sky; wind coldish.
" 27.....	45·0	11·7	Fair; very fine day.
" 28.....	47·1	18·0	Fair; very fine day.
" 29.....	37·0	28·3	Overcast; raw day; wind N.E. fresh; Bow river all open.
" 30.....	49·2	28·8	Cloudy; snow on ground 0 to very few patches.
" 31.....	50·0	27·4	Cloudy; rain and snow.

RECAPITULATION.

PRECIPITATION.

	Snowfall.	Rainfall.
1914.	Inches.	Inches.
November	24·7	0·13
December	2·9	....
1915.		
January	10·6	....
February	7·5	....
March	2·9	0·01
Total precipitation 50 inches.	48·6	0·14

Number of Fair Days.

April	20
May	25
June	20
July	23
August	22
September	16
October	19
November	19
December	18
January	23
February	20
March	17
Total fair days for year	242

METEOROLOGICAL TABLES—Concluded.

TEMPERATURES.

	Maximum.	Minimum.
1914.		
April	65·0° 30th.	8·2° 1st.
May	77·3° 31st.	23·2° 7th.
June	79·3° 2nd.	32·7° 1st.
July	90·0° 31st.	34·0° 16th.
August	89·0° 1st.	28·0° 31st.
September	75·9° 3rd.	28·1° 1st.
October	66·7° 15th.	21·8° 22nd.
November	52·2° 25th.	−15·1° 16th.
December	31·2° 31st.	−18·1° 15th.
1915.		
January	37·4° 3rd.	−19·9° 27th.
February	43·0° 17th.	− 8·5° 14th.
March	61·3° 21st.	− 0·1° 26th.

Extremes: Maximum—July, 1914, 90°.
" Minimum—January, 1915, 19·9°.

The winter of 1914-15 was exceptionally fine.

PART VI

FORESTRY

PART VI

FORESTRY

REPORT OF THE DIRECTOR OF FORESTRY.

FORESTRY BRANCH,
DEPARTMENT OF THE INTERIOR,
OTTAWA, June 14, 1915.

W. W. CORY, Esq., C.M.G.,
Deputy Minister of the Interior,
Ottawa.

SIR,—I have the honour to submit the report of the work of the Forestry Branch for the year 1914-15, and the reports of the officials in charge of the outside divisions.

During the year 1914 there has been a steady advance in perfecting the organization on the forest reserves and developing the improvements necessary for protection and management; the fire patrol outside of the reserves was considerably extended so as to give protection to northern districts not previously reached; and reconnaissance surveys have been continued so that now fairly accurate information has been obtained of the stand of timber and the agricultural possibilities of the lands in the Railway Belt in the province of British Columbia, and a strip approximately 75 miles in width to the north of the prairies in Manitoba, Saskatchewan, and Alberta. The information obtained from these surveys demonstrates clearly that there are large areas in the districts covered that are not fitted for agriculture, and in which the forest will be one of the most important agencies for the development of industries, of population, and of such measure of agriculture or grazing as may be possible. The proportion of mature timber found is comparatively small, and the loss by fire is appalling. If it were fully realized what immense tracts have been swept in this way, what a splendid natural reproduction there is in most cases, how real and imminent the present danger of fire is, and how costly the reforestation by planting at a rate of $7 to $10 per acre of the millions of acres of forest land would be, the strongest efforts would be put forth to save a gift of nature which will be a great factor in building up homes on the prairies.

The weather during a great part of the season of 1914 was very dry and, as a consequence, fires were of frequent occurrence. On the whole, these were kept well under control, as shown by the fact that out of 1,986 fires which were reported, only 388 were of a greater area than 10 acres. The loss of timber from one or two large fires which unfortunately got beyond control made up the heavy total of loss estimated at 507,850,000 feet board measure. As this timber was not in a very accessible position it will probably become a total loss, especially under present market conditions. This emphasizes the fact that until protection is thorough the danger of loss is always serious.

In silviculture the chief work undertaken has been the enforcement of the provision requiring the disposal of the débris of lumbering operations. It was contended by many operators that the piling and burning of débris was too expensive and too dangerous, but experience during the past year has shown that it is perfectly possible financially, as well as otherwise, and that properly handled at the right time of the year there is no danger of fire spreading. If the débris is piled while the lumbering operations are going on, the expense is not great, and it facilitates the handling of the logs so that where it is put in practice, as it is now on all the forest reserves, it only requires a short time for the operators to get used to it, and each year should show less difficulty in its enforcement.

The attention of the Forestry Branch has so far been largely taken up with perfecting plans for the protection of the forests and making the necessary improvements to assist towards that end, but the proper management of operations in the forest must be based on scientific knowledge of the natural conditions, and it has been felt for some time that investigation of this kind should be placed on a systematic basis in Canada. In all countries where forestry has been practised for any length of time, provision has been made for specializing in such work. A plan for organizing scientific forest investigations in Canada and enlisting the co-operation of all foresters throughout the Dominion is now under consideration, and it is expected that during the coming year arrangements will be made for placing the whole matter on a good basis of organization.

In the management of a long-time crop like timber, permanency of policy is a most important factor, and such a policy can be assured only by reasonable permanency in the staff. With the establishment of forest reserves and the endeavour to provide a well-organized management, the necessity for permanency in the staff becomes more and more apparent. Under the present system the forest rangers are not encouraged to qualify themselves for work of a higher or more responsible character or to make any effort to obtain special training in forestry. The work of the forest reserves is becoming more intensive and requires a special knowledge and training, and unless the forest rangers are encouraged by the terms of their engagement to qualify themselves properly it will be impossible to establish an administration which will progress so as to meet the developing requirements.

VISIT TO EUROPE.

During the year 1914 I had the opportunity of visiting Europe as a guest, with foresters from foreign countries and the British Dominions, of the Royal Scottish Arboricultural Society on the occasion of their Diamond Jubilee, and the kindness shown by the society fully justified the traditions of Scottish hospitality. The society gave their guests the opportunity of visiting the Highlands and seeing some of the old natural forests of Scotch pine, as well as many new plantations of various species. It is interesting to note that species of trees from British Columbia, such as Douglas fir (*Pseudotsuga mucronata*), Sitka or Menzies spruce (*Picea sitchensis*), western red cedar (*Thuya gigantea*) and western hemlock (*Tsuga heterophylla* or *Albertiana*) are doing remarkably well in such plantations, and seem to be well suited for the soil and climate of Scotland.

But the Highland hills are generally bare of trees, clad with heather, grazed over by scattered flocks of the black-faced sheep, and with a small or almost non-existent population in the glens. This depopulation of glens, formerly providing homes for a goodly number of families, is causing much anxiety and thought in Scotland, and is attributed to two causes: first, the attractiveness of the colonies, particularly Canada; and, second, the inability of the land in its present mode of use to support a larger population. Agriculture is capable of little further development, unless in conjunction with some other occupation, and sheep grazing does not support a large

population. It is interesting and significant, and is a point that may well be weighed carefully in considering the future development of Canada, that the forest is being looked to as the greatest hope of bringing about an increase in population, and the great difficulty in the way is the cost of the artificial reforestation of the bare hills where nature has no means of accomplishing the work. The grazing of sheep on the hills will not employ a large number of men, not more than one or two to a thousand acres, while the forest, when fully developed and operated, will provide employment for one man per 100 acres. Further, the forest will provide work in the winter for the small agricultural holder, and the extension of the forest is considered an essential to the development of the policy of small holdings in the Highlands, to which much earnest thought is being given at present. The lesson seems very clear that in the development of a country or district where agricultural or climatic conditions are not the most favourable, the forest must be retained as an economic factor if the maximum of population is to be maintained.

The chief centres of forestry education in Scotland, England, Wales, and Ireland were also visited, and the staff in each case were most kind in giving information in regard to the educational work which is being done. I had the pleasure of meeting Sir William Schlich, principal of the School of Forestry at the University of Oxford, one of the leading foresters of the present day, who some fifty years ago with Sir Dietrich Brandis, established the forest service of British India. Sir William strongly advises the determining and setting apart of the non-agricultural lands in forest reserves as rapidly as possible, so that permanent systems of management may be developed. This was the method followed in India, and it has made possible the efficient management of the forests which now exists in that part of the British Empire.

I reached Paris in July and, through the courtesy of Hon. Philip Roy, the Commissioner for Canada, obtained an interview with M. Dabat, the head of the Forest Service of France, who kindly furnished letters of introduction to members of his staff in the various forest districts.

A visit of great interest was made to the sand dunes near Bordeaux in south-western France. These sand dunes, travelling in from the sea by the force of the wind, were in the eighteenth century gradually advancing and covering the fertile lands and even the towns and villages. Toward the end of the eighteenth century the situation had become so serious that the Government began to study the matter, and a scheme of reforestation was evolved which has resulted in covering the threatening sand hills with a valuable forest that yields a harvest of resin and of wood which gives a good return on the investment, furnishes the raw material for industries, protects the agricultural lands, and has made possible a greatly increased population. Much of the wood is exported to furnish pit props for the coal mines of England and Wales, and it is also used to furnish Paris with its wooden pavements. It is a most striking illustration of the value of the forest growth on poor lands.

The Forest School of France at Nancy was visited, where I was very kindly received by the director, and shown through the buildings and museum. The museum is very complete, including samples of wood from all parts of the world as well as France, examples of the various causes of injury to the forests, specimens of birds and game animals which are under the special charge of the Forest Service, models of forests and restoration works, models of machinery, and finally samples of a large variety of manufactured products made of wood. The course of instruction is two to four years, and includes forest management and all subjects directly connected with it, game protection, with engineering and military work. All of the forest graduates are trained for military service, and a large proportion of them are included in the regular army organization, particularly in the engineering department.

Owing to the breaking out of the war it was made impossible to reach the forests of Switzerland, Germany, and Sweden, which it had been proposed to visit.

STAFF.

The organization of the additional forest reserves established during the previous year, which are mainly in the provinces of Alberta and Saskatchewan, and the fuller organization of the Forest Products Laboratories of Canada, together with general development of the work, made a considerable addition to the staff necessary. Since the outbreak of the war, twenty-one officers of the branch have enlisted for active service. The total permanent staff is as follows:—

	Number
Head office	45
District inspectors	5
Forest supervisors	17
Forest assistants	12
Forest rangers	61
Inspectors of tree planting	10
Outside clerical staff	23
Forest products laboratories, technical staff	17
	190

Mr. W. N. Millar, district inspector of forest reserves for the province of Alberta, resigned to accept the position of assistant professor of forestry at the Faculty of Forestry of the University of Toronto, and was succeeded by Mr. E. H. Finlayson, formerly inspector of fire ranging. Mr. Millar rendered valuable service to the department during his term of office in systematizing the work of his district, and his services are being retained in an advisory capacity.

APPROPRIATION.

The appropriation for the year 1914-15 was $660,000, and the refunds by railway companies and timber limit holders of their proportion of fire fighting expenditure brought the total amount available for expenditure to $677,736.35. The expenditure was divided as follows among the various services:—

Salaries at head office	$ 12,627 34
Salaries of officials on military leave	7,680 23
Travelling expenses	1,250 73
Printing and stationery	13,684 57
Miscellaneous expenses at head office	7,364 77
Forest surveys	33,219 00
Forest reserves	291,978 48
Fire ranging	199,235 58
Tree planting	49,158 71
Statistics	9,871 58
Forest products laboratories	51,665 36
	$677,736 35

The field expenditure, exclusive of tree planting on the prairie farms, is divided as follows among the provinces:—

Manitoba	$ 85,543 98
Saskatchewan	101,285 25
Alberta	199,943 09
British Columbia (Railway Belt)	137,660 74
	$524,433 06

CORRESPONDENCE.

The letters received and sent out by this branch were as follows: Number of letters received, 23,671. Mail sent out: Letters, circulars, etc., 46,595; bulletins and reports, 40,988; parcels, 1,615. Total, 112,869.

LIBRARY.

The chief advance in regard to the library and its work during the past year has been the separation of the duties of librarian and editor, heretofore performed by one member of the staff, leaving the officer formerly in charge of both divisions of the work free to devote himself exclusively to the work of the library.

The librarian in a library such as is maintained by this branch, however, is much more than a custodian of books, just as the library is intended to be not merely a collection of volumes but a repository of all knowledge that relates to forestry and allied subjects, whether in books, magazines, pamphlets, or newspaper articles of any form whatever. The aim of the library of the branch is not only the making of a collection as complete as possible of forestry literature (including both the current literature and that published in past years) which will thus serve as a reference library for members of the staff and others engaged in research work in forestry, but also the increase of the efficiency of the staff of the branch generally by keeping the members in touch with forestry and other scientific literature as it appears. The function of the librarian, accordingly, in addition to the general responsibility for the library work, will be to keep the staff of the branch in touch with the current literature of the subject, as well as to supply information, bibliographies, etc., to other inquirers.

The work of indexing current literature has been kept up during the past year, some seventy magazines and four hundred pamphlets having been thus indexed during the year. In addition to these, fifty-seven books were added to the library during the year.

The usefulness of the photographic collection of the branch has been increased by the institution of a ready-reference index of the photographs, made on the principle of a card index. The photographs chosen as sufficiently valuable for a place in this index are printed on double-weight paper of a standard size, and on this special print are typed the more important particulars, such as the title of the picture, when, where and by whom taken, etc. The cards are first divided by a geographical scheme, and then classified under the general scheme of classification adopted in the library. The additions to the collection during the year number 1,563.

It is hoped also that the library may come to be of greatly increased value in the general publicity work of the branch.

PUBLICATIONS.

During the year the following publications were issued:—

Bulletin No. 41, Timber Conditions in the Little Smoky River Valley.

Bulletin No. 44, Wood-Using Industries of the Maritime Provinces.

Bulletin No. 45, Timber and Soil Conditions in Southeastern Manitoba.

Bulletin No. 46, Forest Products of Canada, 1913; Pulpwood Consumption.

Bulletin No. 47, Forest Products of Canada, 1913; Poles and Cross-ties.

Bulletin No. 48, Forest Products of Canada, 1913: Lath and Shingles.

Circular No. 10, The Care of the Woodlot.

The following publications were in the hands of the printer at the end of the fiscal year, and were issued shortly thereafter:—

Bulletin No. 49, Treated Wood-Block Paving.

Bulletin No. 50, Wood-Using Industries of the Prairie Provinces.

Bulletin No. 51, Game Preservation in the Rocky Mountains Forest Reserve.

Bulletin No. 52, Forest Products of Canada, 1913: (being Bulletins 46, 47, and 48.)

STATISTICS.

The collection of forest products statistics by the Forestry Branch is now being carried on by a special staff. It has been found advisable to confine these statistics for the present to the annual production of lumber, lath, shingles, pulpwood, poles, and cross-ties, publishing annual bulletins covering this class of products. In addition to this it has been the practice to make a study each year of the wood-using industries in some region of the Dominion. These studies will eventually cover the whole of Canada. Bulletins have already been published dealing with conditions in Ontario and the Maritime Provinces, a bulletin dealing with the Prairie Provinces is now in the printer's hands, and a study of conditions in Quebec will be made during the summer of 1915.

A satisfactory co-operative plan has been arranged with the Quebec Forest Service by which reports from saw-mills on their annual production of lumber will be gathered by the Quebec Forest Service and compiled and published by the Dominion Forestry Branch. A similar arrangement will be in operation next year with the British Columbia Forest Branch, and in time it is hoped with the other Provincial Government departments. Provincial forest services are in close touch with the lumberman, and in many cases are already engaged in the collection of certain statistics. They are consequently better situated for gathering this information than the Dominion Forestry Branch. It is planned to have the Forestry Branch compile and publish this information in each case.

The annual statistics gathered up to the date of this report include those relating to pulpwood, poles, and cross-ties, for 1914.

During the calendar year 1914 Canada produced 2,196,884 cords of pulpwood valued at $14,770,358. Of this total 55·7 per cent (or 1,224,376 cords) was manufactured into pulp in Canada, and the remainder was exported to the United States in the raw form. The quantity of wood-pulp manufactured in Canada from this wood was 934,700 tons, air dry.

A total of 283,184 wooden poles, valued at $660,262, was purchased in Canada in 1914 by the steam and electric railways, telegraph, telephone, electric light and power companies. This figure is a decrease of 47 per cent from that of 1913.

The steam and electric railway companies also purchased 19,403,646 cross-ties, valued at $8,664,914, these purchases being a decrease of only 2·4 per cent from 1913.

The following is an estimate from the information available of the total value of forest products in Canada during the calendar year 1914:—

Lumber, lath and shingles	$67,500,000
Firewood	60,500,000
Pulpwood	15,500,000
Fence-posts and rails	9,500,000
Cross-ties	9,000,000
Square timber exported	400,000
Cooperage	1,900,000
Poles	700,000
Logs exported	850,000
Tanning materials	22,000
Round mining timbers	500,000
Miscellaneous exports	300,000
Miscellaneous products	10,000,000
Total	$176,672,000

FIRES.

The number of fires reported during the year was 1,986, of which 1,598 were small fires and 388 were large fires, that is burned over more than 10 acres each. The total area burned over, as reported was 690,904 acres, the quantity of merchantable timber burned was 507,850,000 feet board measure, and of smaller-sized timber, 411,-

852 cords. The loss was comparatively small, except in the case of two fires in the Rocky mountains in places not readily accessible, where, owing to high winds, the fires got beyond control.

The causes of fire were as follows:—

	Fires.	Percentage.
Railways	252	13
Saw-mills and logging	20	1
Settlers	454	23
Campers and travellers	291	15
Incendiary	19	1
Lightning	90	5
Other causes	269	13
Unknown	591	29
	1,986	100

It will be seen that the chief known cause of fire is the clearing of lands by settlers. This is particularly the case outside of the forest reserves. It illustrates the necessity for much more thorough education in regard to the danger of fire among those who are settling in wooded districts, and a great many homesteaders are now going on such lands as the edge of settlement advances from the prairie into the northern districts. A little more care in the handling of fire in the clearing of land would greatly reduce the danger. The legislation to meet this situation is not at all adequate, except in British Columbia, where a permit is required from a fire ranger during the season of fire danger before fire can be started for the clearing of land, which enables the fire ranger to see that proper precautions are taken before the fire is started. There is no similar provision even for forested districts in the Fire Acts of the other western provinces, nor in the Dominion homestead regulations. Campers and travellers come second in the main known causes of fire, and railways third. The fires of which the causes are unknown or not specified are 860, and this proportion will remain comparatively large while the ranger districts are as large as they necessarily are at present.

On the forest reserves the railways are the leading cause of fire, being responsible for 117 fires out of 408, a percentage of 29. Settlers come second with 70 fires, and campers and travellers third with 36. The fires from settlement come from districts outside the reserves, and the condition will be improved as the lands around the reserves become fully cleared and cultivated. A good example of this is seen in the Moose Mountain forest reserve, which is located in a good agricultural district that is well settled and where no fires have occurred in the reserve for several years.

Fires and Railways.—Under the arrangement with the Dominion Board of Railway Commissioners, and under the supervision of the chief fire inspector for the board, the inspection of the fire patrol on railways has been carried out on lands where fire prevention is under the jurisdiction of this branch. As a result, the fires along the railway have been decreased materially where the railway companies have co-operated cordially. It is only fair to make special mention of the Canadian Northern Railway Company, which has appointed a special officer to look after this division of the work of the company. A further extension of the use of oil-burning locomotives on the Canadian Pacific railway in the Railway Belt in British Columbia has further decreased the danger along the main line of that railway.

The regulations of the Board of Railway Commissioners make the railway companies primarily responsible for fires occurring within 300 feet of the track, unless such fires have clearly been started by other agencies.

The railway companies make complaint that, while they are required to clear their right of way of combustible material, there are areas of débris and slash along the railway and within the 300-foot limit, for causing which timber operators, provin-

cial road departments, and others are responsible, and the companies consider that these other offenders should be required to remove such danger, and that it is unfair to hold the railways responsible for fires which occur in such conditions. There is considerable force in the complaint, and the Dominion and provincial authorities should take measures to see that the débris of all timber cutting is disposed of so as to do away with this danger.

The only railway company which showed an utter disregard of the instructions of the Board of Railway Commissioners was the Edmonton, Dunvegan, and British Columbia Railway Company. Every regulation and instruction of the board was transgressed by the company, and it paid no attention to the requests of the inspector that the regulations should be observed, and this through a long, dry season when the danger of fire spreading was serious. Over 50 per cent of the fires reported as occurring along railways were credited to this line. Such a situation made necessary an appeal to the Board of Railway Commissioners, which was heard at Edmonton on the 12th of November, and after hearing the evidence the board issued an order requiring the company to take immediate steps to remedy the situation, and commented in the severest terms on its negligence. It is expected that in consequence there will be a decided improvement along this line during the next season.

TREE PLANTING.

The distribution of trees for planting on farms in the Prairie Provinces seems to be meeting a decided want on the part of the farming community. The number of new applications for trees was 3,684, which shows the continued and spreading interest in the improvement of the prairie homes. The fact, as noted by the superintendent, that many farmers, after having established a shelter-belt are making a beginning in growing fruits, both large and small, shows the advantages that will result from such improvements to the farm.

The number of trees distributed in the spring of 1915 was 3,749,300 of deciduous species, as against 3,685,455 in the previous year, and 92,145 of conifers. The greatest demand is from the province of Saskatchewan, with Alberta second.

In parts of the western provinces the season of 1914 was particularly dry especially in southern Alberta and southwestern Saskatchewan. As a consequence the new plantations suffered considerably, although on the whole the reports of the inspectors show that the results were fair and much better than was expected. This is no doubt largely due to the careful requirements in regard to cultivation of the land before the trees are sent out.

The new nursery at Sutherland, Saskatchewan, is being put in order, and it is expected to have considerable stock from that station for distribution in the year 1916.

A number of small forest reserves have been set apart in the province of Saskatchewan, covering rough or sandy lands, and as most of them have been largely denuded of trees, if they ever had any forest covering, it will be necessary to undertake a somewhat comprehensive scheme of planting on these reserves. Arrangements are now being carried out to grow the necessary stock of trees at the nursery station at Indian Head so that the work of reforestation may be begun at the earliest possible day.

WOODLOTS.

As yet only a small percentage of the owners of private woodlands throughout Eastern Canada are giving their lands the proper care and protection they require. However, the number who are beginning to take an interest in the management of their woodlands is steadily increasing.

During the past summer, at the request of the owners, inspections of woodlots were made near the following places: Longford, Ont.; Richmond, Que.; Port Mouton, Bridgewater, Kentville, Middleton, Annapolis Royal, Trenton, Sydney, and Whycoco-

magh, N.S. It is interesting to note that most of the inquiries come not from farmers but from men who live in the towns and own places in the country. Comparatively few of the men actively engaged in farming have yet begun to look upon their woodlot as something permanent and to consider the wood as a crop. Their interest is growing, however, as is evidenced by the inquiries received for the circular issued by this branch, entitled " The Care of the Woodlot."

The greatest demand for this circular comes from Nova Scotia, and this is due to the interest taken by the educational authorities of that province in having it authorized for use in the rural schools in connection with their nature study course. It is fortunate that an interest has been taken in spreading forestry knowledge in this manner, for no province is in a better position to benefit by the practice of woodlot forestry than is Nova Scotia. A large percentage of the timber holdings are small, over one-half of the timbered areas being in holdings rarely exceeding 1,000 acres in extent, and with its mines, pulpwood industries, and facilities for shipping to the West Indies, the province can readily dispose of small-sized material. A ready market for small-sized material means short rotations and quick returns, which is desirable for the small owner.

The average owner is slow to introduce new methods. He desires to be shown before acting, and is quicker to follow a good example than good advice. In every community, where a farmer has protected his woodlot from cattle for a number of years, one or two others will be found who are beginning to do likewise. This willingness to follow a good example is most strikingly exemplified in southwestern Ontario, particularly in Norfolk county. Here a few years ago the Ontario Government commenced planting up certain areas of waste land. The good results of this planting are now beginning to show, and as a result the demand on the provincial nursery from farmers for trees is greater in this county than in any other.

Frequent changes of ownership are a great hindrance to the careful handling of the farm woodlot. One owner may see the advantage of having a permanent source of supply for the wood required about the place and for years give his woodlot every protection and care, and the next owner's first move will be to "clean up," although there may be more land already cleared than he can properly cultivate. The deep-rooted desire to clear land has not entirely disappeared.

The portable saw-mills in certain parts of the country are destroying many valuable woodlots. These mills, which can be moved from farm to farm, are operated by men who offer the woodlot owner a tempting lump sum for his timber. Frequently when they fail to induce the owner to part with it in any other way they will buy the whole farm and after removing the wood re-sell the place, sometimes at a price equal to that paid when the trees were standing. Little of any value remains when the cutting is finished, and the woodlot is usually left in such a condition that to re-stock it with desirable species will require years of careful handling.

Some 14,700,000 acres, or nearly 6 per cent of the farm lands of Eastern Canada, are occupied by woodlots. Much of this is waste area, such as the banks of streams or stony hillsides, the returns from which would not justify its being used for agricultural purposes but which could produce first-class hardwood. The average woodlot in Canada, under proper management, is capable of producing 0·7 of a cord per acre per year. If they were all thus managed the annual production of hardwood from them would equal 10,290,000 cords, or about 5,700,660,000 feet board measure, a quantity more than twenty-one times as great as the whole hardwood cut in Canada during the year 1913.

It has been observed that very few owners are able to distinguish the various tree species with any degree of certainty; but the greatest difficulty the average owner has is in distinguishing the species of new growth. It is quite apparent that unless one knows the species of which the new growth consists it will be difficult to get the best results out of the woodlot, for in many instances it is desirable to know whether to encourage or hold in control new growth.

A bulletin, as free as possible from botanical terms, which may be an aid to the owners of private woodlands in Eastern Canada in distinguishing the various species, is being prepared and is now practically ready for the printer, and it is hoped will prove helpful in this respect.

FOREST RESERVES.

There were no additions to the forest reserves by statute during the past year, but several additional areas which were found to be non-agricultural were temporarily reserved.

When each reserve was established the greatest possible care was taken to eliminate any lands suitable for agriculture, but as representations were made that some such areas of land are included in the forest reserves in British Columbia, a further examination of these lands was made. One of these areas was found to be suitable for a reservoir site, and its withdrawal is not recommended. Other areas, amounting in the aggregate to 12,883 acres, are recommended for withdrawal as, although in most cases there is doubt as to their agricultural value, it is considered advisable to allow the test of actual experiment to decide the question. As the area asked to be withdrawn from these reserves in British Columbia is only about one-half of 1 per cent, it will be seen that little readjustment has been necessary, showing that the examination of the lands was done carefully in the first place.

The permanent forest reserve organization is as follows: District inspectors, 4; supervisors, 17; forest assistants, 21; forest rangers, 61; total, 103.

Improvements.—A large amount of work was done during the year in providing accommodation for the rangers on the reserves, and in opening up roads and trails and making other improvements for protective purposes.

The following is a statement of the improvements and their cost:—

	No.	Expenditure.	Average Cost.
		$	$
Ranger houses—New	7	7,583 75	1,083 40
" Maintenance	6	437 56	72 93
Ranger stables—New	17	3,625 09	213 24
" Maintenance	16	491 23	30 70
Ranger cabins—New	21	4,311 53	205 31
" Maintenance	13	514 66	39 59
Other buildings	10	681 66	68 16
Lookout towers	6	1,032 67	172 11
Bridges	5	165 77	33 15
Roads—New	miles...135	11,134 38	82 40
" —Maintenance	" ...129	5,232 73	40 56
Trails—New	" ...460	19,864 05	43 20
" —Maintenance	" . 139	612 41	4 40
Fireguards—New	" ...139	6,867 67	49 40
" —Maintenance	" ... 79	1,565 96	19 82
Telephone lines—New	" .. 67	6,527 50	97 42
Other improvements, such as fences, etc	.....	4,634 62	....

Timber Operations.—The larger proportion of the cutting on the forest reserves, outside of license berths, is done under settlers' permits. The number of permits issued was 4,183 and the quantity cut thereunder was 5,044,860 feet board measure, 43,290 cords, and 3,297,711 lineal feet, besides other products. The number of free permits was 2,670.

Some of the smaller reserves in the prairie districts are so scantily timbered that it would seem advisable to restrict the privilege of free homesteaders' permits in such reserves.

Owing to the general condition of business there has not been much demand for timber in the western provinces, but a few small sales, four in all, were made, and thirteen sales were in force during the year, the operations on which amounted to 4,115,763 feet board measure, and 962,277 lineal feet.

The disposal of the débris of operations has been better during the past year, and the fire danger from this cause is, therefore, being somewhat reduced. The reports of fires indicate the danger there is from this source—the slashings being both old and new—and a rigid enforcement of the requirement for the disposal of lumbering slash from all operations on the forest reserves, on license berths as well as elsewhere, is necessary if the danger is to be met.

Fires.—On most of the forest reserves the fires were kept well under control, and the only serious loss was in two fires on the Bow River division of the Rocky Mountains reserve which were in a district difficult to reach, and which got out of control owing to the high winds prevailing at the time. These two fires were responsible for damaging 343,500,000 feet board measure, of timber. The summary of fires on the reserves with their causes is as follows:—

Causes.	Fires.	Percentage.
Railways	117	29
Saw-mills and logging	1	*
Settlers	70	18
Campers and travellers	36	9
Incendiary	3	1
Lightning	4	1
Other causes	8	2
Unknown	169	40
	408	100

* Less than 1 per cent.

Surveys.—The only surveys that have been undertaken on the forest reserves are surveys of the topography of the reserves sufficient to ensure accurate mapping and location of improvements and other work, and reconnaissance surveys to ascertain the general conditions on the reserves, the stand and location of timber, etc.

Reconnaissance surveys were carried on on the Duck Mountain reserve in Manitoba by Forest Assistant R. M. Watt; on the Nicola and Hat Creek reserves in British Columbia by Mr. A. M. Thurston, and on the Fly Hills and Tranquille reserves in the same province by Forest Assistant K. G. Wallensteen.

Intensive soil surveys were conducted by Forest Assistants L. Stevenson and D. Lusk on several forest reserves, principally in British Columbia. As a result of these examinations, 21 square miles were recommended for elimination, the land being found to be of some agricultural value.

Under Mr. T. H. G. Clunn, D.L.S., and Mr. A. Gorman, two parties were at work in the Clearwater division of the Rocky Mountains forest reserve during the season, surveying and mapping some of the important trails and rivers. This work was begun in the year 1913, and when completed will greatly facilitate the administration of the reserve. During the past year, 475 miles of main traverse and some 600 miles of secondary traverse were made.

Grazing.—The regulations authorizing the granting of permits for grazing stock on the forest reserves were put in force last season in the provinces of Manitoba, Saskatchewan, and Alberta, and on the whole have worked out well. In the Rocky Mountains forest reserve, almost entirely in the southern part, the stock grazed was 10,589 head of cattle and horses, and 12,000 head of sheep. The average number of stock per permit was: for horses and cattle, 86 head; and for sheep, 2,400 head. It will be seen, therefore, that there was a considerable number of stock grazed on this reserve, and the small number of stock per permittee shows that the purpose of the

regulations to give the small holder an opportunity for grazing is being fulfilled. The same is true in Saskatchewan, where the grazing on all the reserves throughout the prairie country is being rapidly stocked up by permittees, all of whom have small holdings of stock. There is good prospect for expecting that the whole of the available grazing on the reserves will be producing live stock in the near future.

The work of administration has been assisted very greatly by the formation of stock associations among the applicants for grazing stock on the reserves, which have co-operated in carrying out the provisions of the grazing regulations.

The grazing regulations were not put into force in British Columbia, owing to objections to certain phases of them made by the British Columbia stock associations, which it was decided should be considered fully before action was taken. Arrangements are being made for a thorough investigation of the situation in regard to stock-raising in the Railway Belt, and it is hoped that it will result in removing the most important difficulties, and in encouraging the development of this most important industry.

Fishing.—The protection of the fisheries in the forest reserves is carried on in the closest possible co-operation with the Dominion fishery authorities. The regulations governing fishing in forest reserves have been based largely upon those relating to waters outside the reserves, and have been adopted only after consultation with the Department of Marine and Fisheries. Likewise all amendments have been submitted to that department before being recommended for adoption. In the interests of the protection of the fisheries in waters situated along boundaries of the reserves, a reciprocal arrangement has been made whereby certain Dominion fishery guardians will be given the authority of forest officers, and certain forest officers will be given the authority of Dominion fishery guardians in order that, should occasion arise, such officers may be enabled to proceed beyond their ordinary bounds of jurisdiction, when following up cases of infraction of the fishing regulations. It has been found that in some cases offenders against the fishing regulations have escaped punishment owing to the fact that the geographical limit of the officer's authority was reached before he came up with the offender. It is expected that the arrangement referred to will diminish the number of cases of this kind. In being granted these additional powers, neither organization—the fishery guardians and the forest officers—assumes responsibility for the protection of the fisheries in the districts of the other. It is not expected, therefore, that any conflict of jurisdiction will arise.

The forest reserve regulations, except in minor points, are similar to the fishing regulations which apply to waters outside the reserves. There is this distinction, however, that in the forest reserves which lie nearest to settlement, and which contain small bodies of water, only sport fishing is allowed; while in the northern reserves, which are more remote from settlement, and contain large bodies of water in which netting on a commercial scale has been practised for years past, arrangements are being made to continue this form of fishing. It is expected that by properly enforcing regulations regarding the length of season, size limit and per diem catch, sport fishing will be improved.

With a view to experimenting as to the possibility of introducing desirable kinds, 181 adult pickerel were transferred last May from lake Winnipegosis to lake Madge in the Duck Mountain forest reserve. The undertaking was executed under the supervision of Mr. F. K. Herchmer, District Inspector of Forest Reserves, and despite many difficulties caused by adverse weather conditions, the fish were placed in the lake in good condition and ready to spawn. Reports since received indicate that the pickerel are thriving and that the experiment will prove successful.

Game.—An outstanding feature in the work of game protection during the fiscal year was the bringing of the Stony Indians under the operation of the Game Act of the province of Alberta. This was accomplished as a result of strong representations

made to the Department of Indian Affairs which led the Superintendent General of Indian Affairs to issue a proclamation, as provided by the Indian Act, making these Indians subject to the provisions of the Game Act, on the 1st June, 1914. It has been well established that the activities of the Stony Indians, who are expert hunters and mountaineers, have been responsible, more than any other agency, or perhaps than all other agencies combined, for the steady diminution of big game on the eastern slope of the Rocky mountains, and if the Game Act is enforced as regards these Indians, a marked increase in the numbers of big game may be looked for within a comparatively short period.

As foreshadowed in last year's report, a full investigation of the Rocky Mountains forest reserve was made by Mr. W. N. Millar, who was then district inspector of forest reserves and is now assistant professor of forestry at the University of Toronto. Mr. Millar has submitted a report on "Game Preservation in the Rocky Mountains Forest Reserve," which is probably the most exhaustive and comprehensive of its kind as regards the region studied. As the report is being published in pamphlet form, no attempt need be made here at summarization except to say that it contains considerable information as to the numbers and habitats of the various kinds of big game throughout the eastern slope, and outlines the boundaries of several game preserves, recommended after a personal examination of the country involved.

All of the forest reserves in the province of Saskatchewan have been constituted game preserves by provincial enactment, and this branch has co-operated as far as possible with the provincial authorities to protect the game on the reserves. In the case of the larger reserves it would seem to be better policy if only a portion of them were made game preserves, as has been done in the province of Manitoba, as sufficient protection would be given to game, the restrictive law could then be better enforced, and part of the forest would give the sportsman opportunity for taking game.

In the province of Manitoba the small forest reserves and designated portions of the large ones have been made game preserves by provincial authority. This provides protection for the game and at the same time allows the use of large parts of the reserves for hunting big game, and brings in a good revenue to the province.

FIRE RANGING.

The fire ranging outside of the forest reserves was carried out in twelve districts, with eleven chief rangers and 192 rangers. In addition, there were, in connection with railway fire ranging, one divisional inspector and three guardians. As railways and settlement extend farther north, the fire patrol must also be extended, and, although the non-agricultural lands farther south are being gradually absorbed in the forest reserves organization, the extension of the patrols to the north gives no opportunity as yet for reduction in this service. The patrol over the large areas in the north can be carried on only on the main routes of travel, but as these are the main lines of danger the work is much more effective than might be supposed, when the rangers really take an interest in the protection of the forest. On the northern waterways the patrol is carried on by canoe and by power boats. On the Mackenzie River system three steamboats are used and have rendered effective service.

The fire ranging districts and the number of rangers employed are as follows:—

District.	Headquarters.	No. of Rangers.
Manitoba South	Winnipeg	14
Manitoba North	Norway House	13
The Pas	The Pas	16
Battleford	Emmaville	10
Prince Albert	Prince Albert	19
Edmonton	Wetaskiwin	48
McMurray	McMurray	10
Slave	Fort Smith	4
Mackenzie	Fort Simpson	1
Coast	New Westminster	25
Revel-stoke	Revelstoke	16
Salmon Arm	Salmon Arm	16
	Total	192

The number of fires with their causes is as follows:—

Causes.	Fires.	Percentage.
Railways	135	10
Saw-mills and logging	19	1
Settlers	384	27
Campers and travellers	255	15
Incendiary	16	*
Lightning	86	3
Other causes	261	19
Unknown	422	25
	1,578	100

*Less than 1 per cent.

FOREST SURVEYS.

The survey work carried on during the year may be subdivided as follows:—

(1) Exploratory surveys of public lands to classify the lands in regard to their suitability for agriculture or forest production.

(2) Forest surveys on forest reserves. These surveys are generally of a more detailed nature than the exploratory surveys. Their object is to obtain information in regard to forest-types, growth and silvicultural condition of the forest cover, grazing areas, etc., and to suggest improvements in regard to fire protection, road-building and other matters, a knowledge of which is essential to a proper administration of the reserve.

(3) Soil surveys, the object of which is to examine areas within forest reserves in cases where the soil may have some agricultural value.

(4) Traverse surveys.

The exploration parties, nine in number, were located as follows: Manitoba inspection district, one party; Saskatchewan inspection district, four parties; Alberta inspection district, three parties; British Columbia inspection district, one party.

The party in Manitoba was in charge of Mr. E. B. Prowd. This party first re-examined some land on the western shore of lake Winnipeg near Washow bay, and then proceeded to the eastern shore of the lake to explore the country from Winnipeg river northward. Mr. Prowd during the season reached as far north as township 26 and east to the Ontario boundary. This tract included some 2,500 square miles. The country is of the Laurentian formation, is fairly level with rocky or sandy

irregular ridges with intervening muskegs or lakes, and is covered principally with poplar and jackpine on the ridges, and tamarack and black spruce on the muskegs. The soil in the interior is too rough and rocky for agriculture, but along the mouth of the rivers and in places along the lake there are deposits of good soil. Fires have swept this country from time to time with the result that very little timber large enough for lumber is found. Reproduction is good, however, and with effective fire protection large forests of merchantable timber should be available here after a few decades. The main rivers draining the area are the Winnipeg river, the Black river, and the Manigotagan river. These rivers are rather sluggish in places; in other places falls and rapids are found. The inspection made resulted in the temporary reservation of the non-agricultural portion of the area examined.

In eastern Saskatchewan a party under Mr. K. Vavasour continued the examination carried on during the previous three years in the Porcupine and Pasquia hills by Messrs. Van Dusen, Scandrett, and Connell. This year the party covered the country lying north of Carrot river in the vicinity of Saskatchewan river, Torch river, Cumberland lake, Amisk lake, and Nemew lake. The area covered was about 3,300 square miles. The surface of the country is undulating to nearly level, and the divides between the watercourses are poorly defined. The Saskatchewan river and the Carrot river are the greatest factors in the drainage of this region, but the degree of slope in the country is so small that large muskegs have been formed which now cover more than half of the area examined. The whole region is intersected by a network of lakes and streams.

Two areas were recommended by Mr. Vavasour for inclusion in forest reserves. The easterly of these tracts lies south of Amisk lake, and comprises an area of about 220 square miles. The westerly is situated on the Torch and Saskatchewan rivers near the Ravine Bank settlement in township 51, range 4, west of the 2nd meridian, and covers an area of approximately 850 square miles. The proposed reserves contain no agricultural land in proportions large enough to support a settlement, but are mostly wooded with spruce, tamarack, jack pine, and poplar, which timber is valuable enough to warrant good protection. Following Mr. Vavasour's recommendation a temporary reservation has been made of these two areas.

In central Saskatchewan, Forest Assistant G. S. Smith was in charge of a party that examined an area of approximately 2,455 square miles in the vicinity of Crooked lake, Doré lake and Smoothstone lake. The area, in general, is a broken plain characterized by heavy accumulations of drift, which form prominent hills and ridges between which lie stretches of muskeg. The drainage is into the Churchill river; the Smoothstone river and Beaver river, tributaries of the Churchill, being the most prominent watercourses in the examined area. The watersheds are not visibly defined. The rivers of the area have dug narrow, shallow, winding channels, and are characterized by long stretches of slow water, where they pass through the muskegs or meadows, with rapids between. Of the 2,455 square miles examined, 500 square miles are lake and about 770 square miles are covered by muskeg.

The soil in the hills and ridges is as a rule sandy, mixed with boulders and gravel and not suitable for agriculture. In the muskegs, however, the soil is heavier, but it would require an expensive system of drainage to reclaim the muskegs and make them good agricultural land.

The principal tree species of the area are aspen, balsam poplar, white spruce, jack pine, and, on the muskegs, black spruce and tamarack. Aspen is numerically the leading tree of the region, while at the present time white spruce is the only species which is commercially important.

West of the region explored by Mr. Smith, a party under Mr. A. V. Gilbert examined some 2,200 square miles in the vicinity of Beaver river, Crooked river, Waterhen lake, and lac des Isles. The surface form of this country is varied. East

of Waterhen lake it is on the whole low and swampy, with numerous low ridges; west of this lake and east and north of lac des Iles the country is quite hilly. The lowest elevation found was 1,519 feet in the southern portion of the region examined. The highest was 2,280 feet in the northwestern portion or northeast of lac des Isles.

Practically the whole area, except the muskegs, has a sandy soil, varying in coarseness, but over small areas a mixture of clay provides a sandy loam. The muskegs have a heavy clay soil.

White spruce, poplar, and jack pine are the principal trees of the region. The white spruce, which is the only tree used as saw-timber in the region, has a good, healthy growth and the country seems to be well adapted for its production.

In southern Saskatchewan, Mr. L. Stevenson, a soil expert, made an examination of a tract of broken and rugged sandhills lying north and east of Maple Creek in townships 14 to 20 and ranges 21 to 24, inclusive, all west of the 3rd meridian.

The soil consists of pure sand, practically unlimited in depth, and is absolutely hopeless for grain production in a permanent system of agriculture. This country was at one time well-wooded with aspen, cottonwood, balm of Gilead, and willows, but fires of recent years and cutting have reduced in a great degree the varieties useful for fuel or building. If protected and managed, however, the numerous small stands of aspen and cottonwood that are left would supply the settlement sorrounding this area of sand hills with fuel, fence-posts and rough building timber for all time to come. On the recommendation made in the report a temporary reservation of an area of 532 square miles has been made.

In Alberta, one party in charge of Mr. T. Rance examined the country in the vicinity of Frog lake and Cold lake, southeast of lac la Biche. This is a rather flat and low country drained by the Saskatchewan, Sand, and Beaver rivers. The region contains a large number of lakes of varying size. The soil varies from a heavy clay loam with a clay subsoil in the muskegs and sloughs to pure sand in the ridges. The spruce-poplar type of forest cover occupies 55 per cent of the area examined, but large stands of pure poplar or pure jack pine are found. Practically all of the country examined was swept by fire during the summer of 1885 and, as a result, poplar has to a large degree temporarily replaced the spruce. This region, as well as the country examined during the season in Saskatchewan, is, however, essentially a spruce country, and will in time, if properly protected from fires, become reforested with this species.

The total area covered by the party was approximately 2,300 square miles. Of this, 608 square miles have so far been temporarily reserved as a result of the recommendations made by the officer in charge of the survey.

Forest Assistant A. B. Connell had charge of a party exploring the region known as the Pelican Mountain country. The area examined comprises 3,200 square miles, and extends from township 68 north to township 80, and from range 17, west to the 5th meridian. In addition, a rapid exploration trip was made from Wabiskaw north down the Wabiskaw river as far as the mouth of the Woodenhouse river.

The Pelican highland at its highest point in township 77, range 24, reaches an elevation of approximately 3,000 feet above the sea. This is 1,000 feet above Pelican lake and the plain on the north of the hills. The Athabaska river has cut its valley 400 feet below this plain. The drainage from the Pelican highland flows on the south into the Athabaska through Rock Island and Calling lakes. The eastern portion of the upland is drained by Parallel creek, while Pelican river and Wabiskaw river drain the northern and western portions. The soil of the Pelican mountains proper is sandy, with a great number of boulders. The topography is rough, and conditions are here decidedly unfavourable to agriculture. The plains surrounding the h however, are covered with boulder clays, and these lands can in the main be classed as agricultural.

The white spruce is the important commercial tree of this region. It occurs mixed with poplar usually, but also pure in scattered patches of small extent. Jack pine is confined to the sand ridges, and lodgepole pine enters the western portion of the district. Other species found are black spruce and larch on the muskegs, and balsam fir occurring sporadically in small clumps and as single individuals scattered over the region.

Timber of cordwood size covers about 42 per cent of the area examined, while sawtimber is found only on 1 per cent of the area. Muskeg, sloughs, and lakes occupy about 37 per cent of the tract, and recent burns cover about 19 per cent.

Mr. Connell recommends that the Pelican highland, covering an area of approximately 700 square miles, which, by reason of the coarseness of the soil and the rough topography is absolute forest land, should be included in a forest reserve.

The third party in Alberta was in charge of Mr. W. A. Delahey. This party examined some lands, altogether about 900 square miles, in the foot-hills of the Rocky mountains and bordering on the Rocky Mountains forest reserve. Most of this land was found to be rough and of no agricultural value and has been recommended to be added to the Rocky Mountains forest reserve.

In British Columbia, a party under Mr. C. R. Mills continued the exploration carried on in the Railway Belt during the last four or five years. The examination this year covered the country between the Columbia river, where it flows south through Revelstoke to the Arrow lakes and the Yoho park. Owing to the rough character of the country, timber estimating and the separating into different types was not attempted. The survey confined itself to the separation of agricultural lands from non-agricultural lands.

This region is very mountainous, the two great ranges, the Rocky mountains and the Selkirk mountains, occupying the whole area. Practically all of the agricultural land of the area lies along the Columbia river, running in a strip from one-half to three miles wide on each side of the river. Here the soil is a sandy loam, becoming gravelly and strewn with boulders nearer the mountains.

The forest growth varies considerably, owing to the difference in climate. The Dry Belt type, Douglas fir and lodgepole pine, occurs from where the Columbia river first enters the Railway Belt down to about Donald, where cedar and hemlock, characteristic of the Wet Belt type, begin to make their appearance, replacing lodgepole pine. These species increase in numbers as we go farther down the river. The agricultural lands in the Columbia River valley largely depend for fertility upon irrigation, and Mr. Mills recommends the including of this mountainous area in a forest reserve to preserve the timber and thus ensure the water supply for irrigation. This survey completes the reconnaissance of the Dominion Railway Belt.

FOREST PRODUCTS LABORATORIES.

At the beginning of the present year the system of records for the forest products laboratories had been arranged, a library begun, and the divisions of timber physics and timber tests had been organized.

During the year the divisions of timber physics and timber tests have been completed and more fully equipped. Special studies were begun of Douglas fir and of mining timbers from Nova Scotia, and are progressing satisfactorily.

The investigation of mine timbers in Nova Scotia was taken up in co-operation with the Mining Department of McGill University and under the general supervision of Dr. A. B. Porter, the head of that division. Conditions in the forests and mines of Nova Scotia are being studied on the ground by Mr. J. W. McLeod.

The pulp and paper division was organized during the year under the special charge of the superintendent. The greater part of the year has been taken up with getting the necessary equipment and staff. A well-qualified staff both from the scien-

tific and practical sides has been selected. A full equipment for the manufacture experimentally of pulp and paper has been almost completely installed and during the coming year the investigations which are considered most important to this great Canadian industry will be taken up. It is a matter for pride and congratulation that we have perhaps the most complete and well-equipped plant for experimental work in pulp and paper now in existence. The investigations that will be taken up are being determined in consultation with the advisory committee.

It had been intended to defer the establishment of other divisions till later, but it was found that the need for information in regard to wood preservation made it advisable to organize this division, which was done with Mr. W. G. Mitchell in charge. A special study has been made of the use of treated wood blocks for street paving and, in co-operation with the railway companies, the preservative treatment of railway ties.

A division which will study the lumber industry and the question of utilization of waste in connection therewith is one that it is very desirable to provide for in the near future.

Co-operation between the educational institutions and the Government departments in research is highly desirable so that the development of the natural resources of the country may be carried out efficiently and the co-operation begun by the Forestry Branch with McGill University is being extended to other universities. In this direction it has been arranged with Queen's University to have a special study of waste sulphite liquors carried out by Mr. J. A. McRae of the staff of that university, as part of the scheme of investigation of the pulp and paper division of the forest products laboratories. It is hoped to interest other universities in special lines of research.

Thanks are due to the advisory committee and to the staff of McGill University for advice and assistance in planning and carrying out the work of the laboratories.

REINDEER.

As shown in the report of last year, the reindeer herd was reduced by various causes from the original fifty head to only four animals. The chief cause of this reduction was the ravages of an insect pest known locally as the "bull-dog fly," which irritated the animals beyond control and caused them to stampede.

It having been demonstrated that it is impracticable to maintain reindeer in the vicinity of Fort Smith, where "bull-dog flies" are very numerous during the season, it was decided to transfer these four animals to a suitable island in Great Slave lake and endeavour to breed them with the native caribou, which they closely resemble. Local Indians had promised to assist in the capture of caribou for this purpose, and it was hoped that if a sufficient number of these animals could be captured, the knowledge already gained, combined with the apparent suitability of the new ground selected would result in bringing the experiment to a more successful issue.

Under the circumstances, the importance of securing a number of caribou of both sexes was fully recognized, and the officers on the ground were instructed not to depend altogether upon the Indians, but to make every effort themselves to get additions to the herd.

In June, 1914, the reindeer were transferred to Moose island in Great Slave lake, near Fort Resolution, but not before two others had died, leaving two only. The forestry patrol steamer *Hope* was used to make the transfer, and Messrs. Boyd and Davison, of this branch, who were in the vicinity at the time, accompanied the animals and saw them located. In September they were taken across the lake and placed on Big island opposite Fort Rae. The chief herder has since reported this island to be eminently suitable for the purpose; that moss is plentiful and that high open spaces suitable for summer grazing abound. He stated that he had made arrangements to attempt to snare a number of caribou as they passed through that vicinity in the spring.

The latest reports from Fort Smith (February 4, last) show that at Fond du Lac, on lake Athabaska, caribou were plentiful, and that the prospects of securing a number of them when they were moving north were excellent. No further information has been received up to the time of writing, so that it is not known whether any caribou have been captured. It is hoped, however, that the reports when received will be favourable, as now that a suitable feeding ground has been discovered and the requirements of the animals are better understood, the work of building up a herd of domesticated reindeer or caribou can be carried on under much more favourable conditions.

WOOD BISON.

It has been ascertained that the wood bison range the country from Great Slave lake on the north to the Peace river on the south. As the district over which they range is large and remote from settlement, it has been found difficult to secure very complete information at first hand, with only a small patrol, but it has been fairly well established that though the bison move about in small scattered bands, there are three principal ranges where the larger bodies of the animals are to be found. The largest herd known as the "southern herd" frequents the country north of the Peace river between the 111th and the 115th meridians of longitude; the "western herd" has for the centre of its range the intersection of the Little Buffalo river with the 114th meridian of longitude (5th Dominion meridian), southwest of Fort Smith, and the "northern herd" occupies the Resolution range, which extends from the mouth of the Little Buffalo westward through the country along the southern shore of Great Slave lake.

These three ranges are well adapted to the requirements of the bison, as they consist of rolling country, broken by lakes and rivers. These bodies of water are fringed with timber, but there are large areas of hay sloughs and open muskeg country lying between, which afford abundance of feed in both summer and winter. There are also large quantities of salt to be found which furnish salt-licks.

Although the investigations so far conducted have not yielded any direct evidence of the killing of bison by wolves to any serious extent, it has been shown that wolves exist in large numbers, and while the young bison are usually kept in the middle of the band, the small size of some of the bands may possibly render it difficult for the animals to protect their young when attacked by large bands of wolves. If it should be shown upon further investigation that such is the case, it may be found necessary to consider the desirability of making the wolf bounty sufficiently attractive to induce experienced hunters to make organized efforts to accomplish the destruction of wolves.

Respectfully submitted,

R. H. CAMPBELL,
Director of Forestry.

STATEMENT of Revenue, Forestry Branch, Fiscal Year, 1914-15.

Forest Reserve.	Timber Fees and Dues.	Timber Seizures	Grazing Permit and Trespass Dues.	Hay Permit and Seizures	Surface Rentals.	Special Uses.	Nursery Stock.	Unclassified.	Total.
	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.
Turtle Mountain	124 15	15 50	432 25	85 40	60 00			43 30	764 60
Spruce Woods	27 75			34 80					62 55
Riding Mountain	6,204 24	194 15	124 25	181 30	5 00	101 00			6,809 94
Duck Mountain	2,315 77	119 18		19 95	25 00	201 00			2,680 90
Moose Mountain	258 60	98 70	144 00	70 10	42 00	3 00			616 40
Beaver Hills	46 75	7 00		50 50					104 25
Porcupine	309 45		31 55	69 15		1 50			414 65
Fort a la Corne	302 15			1 15		25 25			328 55
Pines	303 25	5 50	34 25	31 55		0 25			374 80
Nisbet	1,149 69	196 35	23 95	28 20		0 25		30 00	1,428 44
Pasquia Hills	151 75			1 00		0 50			156 25
Big River	5 75		9 25	17 00		0 25		0 25	32 50
Steep Creek	12 00								12 00
Sturgeon	7 80			2 00		0 25			10 05
Keppel	263 75		11 00						274 75
Manitou	157 30		500 80	8 20		5 50			671 80
Dundurn	15 50		103 15			0 25			118 90
Seward			44 95	3 90		1 00			49 85
Elbow	33 50		207 57	19 25		3 00			263 32
Cypress Hills	773 21	29 15	25 60	775 15	490 00				2,093 11
Cooking Lake	33 45		28 25	86 45		0 25			148 40
Crowsnest	3,782 58	374 68	3,542 61	89 50	108 20			10 00	7,907 57
Bow River	149 65	182 94	743 19	19 25	42 79	0 75			1,138 57
Clearwater	5,977 24	636 25	27 70	10 25	53 55			2 00	6,706 99
Brazeau	2,071 21	898 20				10 25			2,979 66
Athabaska			23 25						23 25
Lesser Slave	0 50			3 25					3 75
British Columbia Reserves	69 10			13 85	133 40	34 25			250 60
Indian Head Nursery						9 50	1,245 23		1,254 73
Totals	24,549 09	2,757 60	6,060 57	1,625 15	959 94	398 00	1,245 23	85 55	37,681 13
Less Refunds									1,889 37
Net total									35,791 76

Statement of Timber Permits issued on Forest Reserves, Fiscal Year, 1914-15.

Forest Reserve.	No. of Permits.		Kinds and Quantities of Timber Authorized to be Cut.								Dues and Fees.
	Free.	Paid.	Roof Poles.	Fence Rails.	Fence Posts.	Saw Timber.	Mine Timber.	Building Logs.	Green Fuel.	Dry Fuel.	
						Ft. B.M.	Lin. Ft.	Lin. Ft.	Cords.	Cords.	$ cts.
Turtle Mountain	77	26			1,450	14,000		2,088		2,047	124 15
Spruce Woods	35	9		1,500	1,100	300		2,600		643	27 75
Riding Mountain	273	475	1,100		14,511	2,320,562		9,701	141	4,295	5,056 34
Duck Mountain	193	161	1,400	200	19,475	954,128		27,568		2,828	2,013 27
Moose Mountain	17	130	715	2,075	3,300			6,310	690	379	258 60
Duck Mountain	97	23	3,050	13,060	10,870	628,277		28,040		310	202 50
Beaver Hills	108	3	320		2,320	63,050		6,000		1,327	46 75
Porcupine-Pasquia	87	16			4,600	343,190		17,300	36	845	297 70
Fort à la Corne	193	64	8,015	6,825	20,357	224,547		43,821		2,716	302 15
Pines	171	53	1,740	700	15,280	71,525		17,180	18	3,741	303 25
Nisbet	73	68	3,468	6,542	7,970	41,647		37,532	10	4,174	1,149 69
Big River	12	1	5,950	2,000	2,000	9,250				223	5 75
Steep Creek	10	1	300	2,000	1,700	1,000		1,000		190	12 00
Sturgeon	1	1	45					640		50	7 80
Keppel	179	75	34,615	71,200	77,475	3,550		252,520	91	3,375	263 75
Elbow	118	3	63							1,402	33 50
Manitou	154	55	21,650	64,675	43,010			24,970	671	2,158	157 30
Dundurn	30	7							6	643	15 50
Cypress Hills	424	189	117,913	160,095	120,800			532,191	184	4,372	595 46
Cooking Lake	10	7	60		1,000	11,930		16,700		152	33 45
Crowsnest	342	119	18,928	25,725	34,386	260,085	50,200	170,430		4,841	667 53
Bow River	48	22	3,050	10,675	9,190	9,000		34,616		678	149 65
Clearwater	6	2	400	2,000	500		8,000	3,000			2,456 72
Brazeau	1			1,500	500			2,460			0 25
Lesser Slave	2		400	3,500	1,000			5,460		15	0 50
British Columbia Reserves	10	7	1,000	700		2,000		3,350	2	47	19 10
Totals	2,671	1,517	224,182	374,372	393,094	4,988,041	58,200	1,245,971	1,849	41,451	14,200 41

Timber Seizures on Forest Reserves, 1914-15.

Reserve.	No. of Seizures.	Description and Quantities of Timber Seized.								Trespass Dues.	Collections, on account arrears and current seizures.
		Roof Poles.	Fence Rails.	Fence Posts.	Saw Timber.	Ry. Ties.	Mine Timber.	Building Logs.	Dry Fuel.		
					Ft. B.M		Lin Ft.	Lin Ft.	Cords	$ cts.	$ cts.
Turtle Mountain.	2								15	15 50	15 50
Riding Mountain	22			656	33,438				33	250 00	194 15
Duck Mountain..	4				400			1,14	13	44 90	119 18
Moose Mountain.	51	300		445				944	232	144 85	98 70
Beaver Hills.	1							700		7 00	7 00
Pines	3								43	44 00	5 50
Nisbet	8			5,000		1,800			1,038	1,233 25	196 35
Cypress Hills	8	169		150				970		29 15	29 15
Bow River	1			500						5 00	182 94
Crowsnest.	9	2,832	61	1,142			61,138	1,710	3	381 98	374 68
Brazeau	1					850	297,664			1,613 02	898 20
Clearwater											636 25
Totals.	110	3,301	61	7,893	33,838	2,650	358,802	5,464	1,377	3,768 65	2,757 60

Grazing Permits issued on Forest Reserves, Fiscal Year 1914-15.

Forest Reserve.	No. of Permits.	Number of Stock.				Dues and fees collected.
		Cattle.	Horses.	Sheep and Hogs.	Total.	
						$ cts.
Turtle Mountain	35	462	8		470	432 25
Riding Mountain.	7	473	5		478	124 25
Moose Mountain.	17	533	20		553	144 00
Porcupine-Pasquia	3	76	52		128	34 55
Pines	15	80	28		108	34 25
Nisbet	6	47	19	22	88	23 95
Big River.	1	20			20	9 25
Keppel	2	31	11		42	11 00
Manitou.	40	987	549		1,536	500 80
Elbow	17	499	172		671	190 57
Seward	7	118	35		153	44 95
Dundurn	7	318	23		341	103 15
Cypress Hills	1					25 60
Crowsnest.	95	7,992	994	12,600	20,086	3,542 61
Bow River	20	2,095	222		2,317	743 19
Clearwater.	4	80	22		102	27 70
Athabaska	9	12	72		84	23 25
Cooking Lake	10	31	72		103	28 25
Totals	296	12,954	2,304	12,022	27,280	6,043 57

Grazing Trespass on Forest Reserves.

Forest Reserve.	Number of Stock.	Period of Trespass.	Trespas Dues.	Collections Current and Arrears.
			$	$ cts.
Moose Mountain	20	5 months	5 25	
Elbow	67		17 00	17 00
Totals	87		22 25	17 00

Hay Permits issued on Forest Reserves, Fiscal Year 1914-15.

Forest Reserve.	Number of Permits.	Number of Tons.	Dues and Fees.
			$ cts.
Turtle Mountain	40	749	89 40
Spruce Woods	16	223	34 80
Riding Mountain	98	1,512½	181 30
Duck Mountain	13	173	19 95
Moose Mountain	29	657	70 10
Beaver Hills	29	422	50 50
Porcupine-Pasquia	6	265	47 80
Fort à la Corne	1	9	1 15
Pines	18	288	31 55
Nisbet	11	212	28 20
Sturgeon	2	3	2 00
Big River	5	157½	17 00
Elbow	6	175	19 25
Seward	2	34	3 90
Manitou	6	67	8 20
Cypress Hills	286	7,037	775 15
Cooking Lake	16	572	85 70
Crowsnest	19	359½	87 00
Bow River	8	172½	19 25
Clearwater	1	100	10 25
Lesser Slave	1	30	3 25
B. C. Reserves	7	121	13 85
Totals	620	13,339	1,599 55

Hay Seizures on Forest Reserves: Fiscal Year 1914-15.

Reserve.	Number of Seizures.	Number of Tons.	Trespass Dues.	Collections on Current Seizures and arrears.
			$ cts.	$ cts.
Moose Mountain	2	60	7 00	
Porcupine	4	257	26 60	22 35
Crowsnest	1	2	2 50	2 50
Cooking Lake	1	5	75	75
Totals	8	324	36 85	25 60

TIMBER Cut on Forest Reserves under authority of Timber Sales. Fiscal Year 1914-15.

Reserve.	Previous Sales still operating.	Sales made Current year.	Sawn Timber.	Mine Timber.				
				Props.	Props.	Lagging.	Lagging.	Lagging.
			Ft. B.M.	Ft. B.M.	Lin Ft.	Cords.	Ft. B.M.	Lin. Ft.
Riding Mountain	3	1	362,378					
Cypress Hills	1		48,864					
Crowsnest	3	1	1,904,278	350,947	333,155		20,812	
Brazeau	1			747,394				
Clearwater	1	1	71,980	448,140	629 122	209		412,624
Fly Hills		1	181,782					
Totals	9	4	2,569,282	1,546,481	962,277	209	20,812	412,624

STATEMENT showing the quantity of Timber Sold and Revenue Due during the Fiscal Year ending March 31, 1915, on License Timber Berths within Dominion Forest Reserves.

MANITOBA.

Forest Reserve.	Timber Berths.	Areas in Reserve.	Quantities Sold.			Revenue.		
			Lumber.	Laths.	Other Products.	Dues Payable.	Rent Payable.	Total Payable.
	No.	Sq. M.	Ft. B. M.	No.		$ c.	$ c.	$ c.
Riding Mountain	5	45	1,400,790			700 39	227 15	927 54
Duck Mountain	11	100	5,615,823	2,109,329		2,924 28	499 90	3,424 18
Total	16	145	7,026,613	2,109,329		3,624 67	727 05	4,351 72

SASKATCHEWAN.

Porcupine and Pasqua	51	1,055	35,557,604	13,820,250	2,210 lin.ft mining props, 1,397 posts	20,887 73	5,116 90	26,004 63
Sturgeon	12	178	24,765,713	4,894,600		6,694 65	891 33	7,585 98
Big River	4	283	1,262,768	213,850	1,008 posts 141 cords	663 46	1,416 25	2,079 71
Nisbet and Pines	6	117			22,748 cords	5,688 33		5,688 33
Total	73	1,633	61,586,085	18,928,700	As above	33,934 17	7,424 48	41,358 65

ALBERTA.

Crowsnest	12	259	2,373,641		120,415 lin ft. mining props	1,453 60	1,295 95	2,749 55
Bow River	16	374	7,825,523	446,909	9,689 posts	3,792 47	1,860 95	3,653 42
Clearwater	4	378					1,887 80	1,887 80
Brazeau	12	226			15,555 ties.	233 32	1,131 30	1,364 62
Total	44	1,237	10,199,164	446,909	As above	5,479 39	6,176 00	11,655 39

BRITISH COLUMBIA.

Total all B.C Reserves	11	134	78,735			39 37	667 85	707 22
Grand total	144	3,149	78,890,597	21,484,929	*	43,077 60	14,995 38	58,072 98

* The grand total of other products comprises 12,044 posts; 22,889 cords; 122,625 lineal feet mining props and 15,555 ties.

REPORT OF THE CHIEF OF THE TREE PLANTING DIVISION.

INDIAN HEAD, SASK., March 31, 1915.

SIR,—I have the honour to submit herewith my thirteenth annual report dating from March 31, 1914.

CHANGES IN STAFF.

Mr. S. S. Sadler, who had been my assistant since May 8, 1911, resigned on July 15, 1914.

Mr. A. E. Wyatt, clerk, enlisted with the second Canadian contingent, leaving the office on November 30, 1914.

Notification was received in August, 1914, of the appointment of Mr. C. T. Goulding to the position vacated by Mr. Sadler. On February 10, 1915, Mr. Goulding was transferred to the office of the Immigration Department at Winnipeg to assist in the work of government seed grain distribution.

Mr. R. L. Challoner was, on February 26, appointed to the position vacated by Mr. A. E. Wyatt.

Mr. James McLean was appointed superintendent of the new nursery station at Sutherland, and assumed his duties on May 7, 1914.

GENERAL OBSERVATIONS.

The season of 1914 was one of the most unfavourable for general farming operations experienced since the commencement of our distribution work in 1901. Certain districts it is true, received a fair supply of moisture, but these areas were small in comparison with those that suffered from extreme heat and drought. The districts most severely affected lie in central western Saskatchewan and southern Alberta. Here, in the large majority of cases, crops were practically a total failure. In northern Alberta, conditions were evidently about normal, and in certain portions of south-eastern Saskatchewan and Manitoba nearly normal, so far as the total precipitation was concerned; but even in the most favoured districts the rains came too late to give the best results and, as a consequence, the general grain yield, even in the best districts, was considerably below the average.

The plantations naturally suffered under these adverse conditions, though not nearly to such an extent as might have been expected. When it is realized that in many of the dry districts there was not even sufficient moisture to germinate the grain, it is almost surprising to learn that even in these districts the plantings of 1914 were not absolute failures. In fact it was often remarked that the trees were the only things that showed any growth.

This season has emphasized more clearly than ever the absolute necessity for a good preparation of the soil before planting, so that all possible moisture may be stored in the ground to carry the newly planted stock over a period of drought. We have, during the past several seasons, experienced such generally favourable growing conditions that the necessity for a strict observance of this regulation has occasionally been overlooked. There is no reason why every planter could not summer-fallow the comparatively small area to be devoted to tree planting, and I am strongly of the opinion

that this rule should in the future be rigidly enforced. Old garden land and backsetting do not give good results, unless conditions are exceptionally favourable, and it would undoubtedly be in the interest of all concerned, especially in that of the planter himself, if summer-fallowing as a preparation were in every case, insisted upon. Almost without exception, seedlings and cuttings planted on good summer-fallow were successful last season, whereas the percentage of failures on garden and potato ground and new land, particularly in the dry districts, was very high in comparison with other seasons.

It is interesting to learn from our inspectors how many farmers are now going more into growing fruits, both large and small, after they have once secured a small shelter-belt. Cases of standard apples being ripened are reported this season, and, of course, the plantings of crab apples and native plums are numerous. Although very little, so far, has been done in Saskatchewan and Alberta in the growing of standard apples, a few isolated cases of fruits having been matured show that apple growing under prairie conditions may eventually become quite possible; not, perhaps, on a commercial scale, but for home consumption on the farm. Standard apples of the following varieties were ripened during 1914 at widely separated points: at Lethbridge (Alberta) Experimental Farm, Hibernal, Duchess, and Simbirsk; at Glen Ewen (Saskatchewan), Hibernal; at the Forestry Branch Nursery Station at Indian Head (Saskatchewan) Hibernal and Blushed Calville; in a private garden in Indian Head, Hibernal. In Manitoba, Mr. Stevenson, of Dunston, has an orchard which has yielded as many as 200 barrels of good apples in one season; and hardy standard apples have been matured at many other points in Manitoba. As farmers gradually get their shelter-belts established, I think it more than probable that standard apples will be grown almost as a matter of course, the main essential for success lying in securing only tested varieties, and using only stock propagated in the West.

Judging by the enormous increase in applications and correspondence this spring, the general interest in tree planting is greater than ever. This spring we have on our lists 3,684 fresh applications as against 1,559 last year. Greater publicity was this (1914-15) winter given to our distribution by enlarging our advertising space and making the advertising more conspicuous by using cuts. Judging from the correspondence received, the success of our older plantations, which are now large enough to unquestionably demonstrate their usefulness, has been largely instrumental in creating an increased demand for our stock.

INSPECTION WORK.

The following inspectors were employed during the past season: Messrs. A. P. Stevenson, Angus Mackintosh, Jas. Cowie, Geo. Kennedy, W. Guiton, Wm. Macdonald, D. Macdonald, John Reay.

The following tables 1, 2, and 3 show the districts covered by each inspector, number of applicants in each district, trees allotted, etc.

TABLE No. 1.—Table showing Annual Distribution of Deciduous Stock.

Table A.	1910.	1911.	1912.	1913.	1914.	1915.
Number of applicants receiving trees	3,173	3,285	3,618	3,536	3,420	3,516[1]
Seedlings and cuttings distributed.	2,533,600	2,636,100	2,729,135	3,495,375	3,685,455	3,749,300[2]
Average number per applicant	798	721	626	988	1,077	1,066[1]

Table B.	1910.	1911.	1912.	1913.	1914.	1915.
Number of applicants on inspection list	8,318	8,036	7,375	6,987	7,169	9,878[1]
Number of new applications received	3 832	2,656	1,649	1,899	1,559	3,684[1]

[1] Compiled March 31, 1915. Figures will be slightly altered when 1915 lists are completed.
[2] Supplementary to these figures considerable stock will be shipped to the Sutherland (Sask.) Nursery Station, Manitoba Education Department and other public institutions.

TABLE No. 2.—Table of Classification for 1915 Distribution.

Classification.	A. P. Stevenson.	A. Mackintosh.	Wm. Macdonald.	J. Cowie.	G. Kennedy.	J. Reay.	W. B. Gniton.	D. Macdonald.	Totals.
A—1. Number of applicants on inspection list, 1914.	434	463	1,084	1,037	1,097	1,057	1,144	853	7,169
2. Number of applicants who had received trees in 1914 or previous to that year.	327	322	738	691	844	583	749	529	4,783
3. Number of applicants who had not received trees in 1914 or previous to that year.	107	141	346	346	253	474	395	324	2,386
B—1. Number of applicants receiving trees in 1915.	213	179	566	541	484	540	551	442	3,516
2. Number of old applicants receiving trees in 1915.	153	99	309	340	296	250	321	242	2,010
3. Number of new applicants receiving trees in 1915.	60	80	257	201	188	290	230	200	1,506
C—1. Number of applicants not receiving trees in 1915.	221	284	518	496	613	517	593	411	3,653
2. Number of old applicants not receiving trees in 1915.	174	223	429	351	548	333	428	287	2,773
3. Number of new applicants not receiving trees in 1915	47	61	89	145	65	184	165	124	880
D—1. Number of plans drawn	149	134	440	380	359	402	428	346	2,638

NOTE.—There will be a slight alteration of the above figures before the 1915 shipping list is completed on account of cancellations and additions to be received after this date, March 9, 1915.

TABLE No. 3.—Table showing Distribution of Trees in relation to Districts—1915.

Inspector.	District.	No. Men on List	No. to Receive Trees.	No. Trees Allotted.	Average No. Trees per Applicant.
A. P. Stevenson	Central and Southern Manitoba	434	213	179,775	844
A. Mackintosh	Central Saskatchewan and G.T.P. east of Saskatoon	463	179	189,650	1,059
Wm. Macdonald	Southeastern Saskatchewan	1,084	566	635,525	1,122
G. Kennedy	Central and Northern Saskatchewan Northern Manitoba	1,097	484	596,900	1,233
J. Cowie	Southern and Western Alberta	1,037	541	582,200	1,076
J. Reay	Northern Alberta	1,057	540	500,050	925
W. B. Guiton	Southern and West'n Saskatchewan	1,144	551	593,450	1,077
D. Macdonald	Central Saskatchewan	853	442	471,750	1,067
Distribution for 1915. Totals		7,169	3,516*	3,749,300*	1,066*

* Figures marked * are approximate only, as this table is prepared March 9, 1915, and lists cannot be definitely made up until shipping season is completed.

SUMMARIZED REPORTS OF LOCAL CONDITIONS.

Following are summarized reports of conditions in each inspection district:—

District covered by A. P. Stevenson: Central and Southern Manitoba.—The plantations of 1914 as a whole were well cared for, and 95 per cent of the young stock had made a good start. Plantations of 1913 were doing well, but some winter-killing was evident, especially on high ground. This was undoubtedly caused by a lack of snow-covering during the early part of the winter. Plantations set out previous to 1913 were very good. In the district covered, weather conditions were very unfavourable on account of extreme drought. Spring opened well with fair amount of rain, but dry weather set in early in July and, with the exception of a few local showers, very little rain fell during the summer. The effects of this were noticeable, particularly in the failure of newly set cuttings to strike, the losses in many cases being as high as 50 per cent. The canker worm gives indications of becoming a serious pest and is increasing rapidly in southern Manitoba. The larvæ of this insect attacks particularly the Manitoba maple.

District covered by A. Mackintosh: Central Saskatchewan and the line of the Grand Trunk Pacific Railway east of Saskatoon.—Plantations of 1914 everywhere showed effects of the dry season, although failures were unexpectedly small. The effects of the drought were manifested mainly in a less than average growth rather than in actual deaths. The Manitoba maple seemed to show better results, so far as becoming properly rooted under the dry conditions, than the ash seedlings, or willow and Russian poplar cuttings. Plantations set out in 1913 stood the drought well, though the growth was, of course, not up to the average. Plantations set out previous to 1913 have now, in the majority of cases, shaded the ground and become well established. Growth generally matured much earlier this season than usual. Only one wet day (July 13) was experienced from the date of leaving Indian Head, June 1, till the time of returning, November 1. Some local showers and snow flurries were general in October. Apparently there has been better than average cultivation in the preparation of ground for 1915 planting. Evergreens set out last spring and in previous seasons were doing quite well, deaths not exceeding 10 per cent.

District covered by James Cowie: Southern and Western Alberta.—The greater portion of this district lies in the areas most affected by the extreme drought. Total crop failures were experienced in many places, due to the exceptional conditions and, naturally, the newly set out plantations suffered with other vegetable growth. It is estimated that 50 per cent of the seedlings and cuttings planted in this district never took hold. There was very little snow during winter of 1913-14, consequently the soil in early spring was very dry, and only in those cases where ground had been exceptionally well prepared was there any degree of success with the new plantings. Practically no rain fell during the summer. In many cases grain sown never even germinated till after the rains which came towards the latter part of the season. Plantations set out previous to 1913 were doing well, and were but little affected by drought. Many of these are now from 10 to 15 feet high, and farmers are realizing great benefit from them as a protection to small fruits and garden crops. Evergreens planted in 1912 and 1913 have done well. It is estimated that about 90 per cent of these are still living. Those set out in 1914, however, have been very badly affected, though the results, as learned from reports sent in by the individual planters, were very much more favourable than might have been expected. Preparation of ground for 1915 planting was frequently impossible, so that many prospective planters were advised to hold their applications over for another season.

The varieties most suitable for this district are Russian poplar, ash, and caragana; though a small percentage of maples and willows is also advisable in most of the plantings.

District covered by Geo. Kennedy: Central and Northern Saskatchewan and Northern Manitoba.—Conditions were exceptionally dry, resulting in probably 25 per cent of failures in the various plantations set in 1914. The greatest number of deaths was in cutting stocks of poplars and willows; the cuttings drying out before there was any chance for them to throw out roots. Such stock as survived made a small but healthy growth. Plantations set out in 1913 and previous years made excellent growth and seemed to be but little affected by the drought, except that the growth was somewhat less than average. Plantations of six years' growth and over appeared unaffected. Such older plantations are greatly appreciated by their owners, as they are now commencing to become really effective as wind-breaks and in stopping the drifting of snow around the buildings in winter. There was, practically, no rain in this district till about September 15. During the later months good rains were fairly general. Very little damage was noted from winter-killing. Many evergreens were seen, and it was estimated that 90 per cent of the trees set out were doing well. There is likely to be a greatly increased demand for this class of stock. The care and cultivation of the plantations have on the whole been excellent, very few cases of actual neglect being observed.

District covered by W. B. Guiton: Southern and Western Saskatchewan.—In the district covered, a certain portion (being roughly townships 1 to 20, inclusive, in ranges 1 to 9) experienced average conditions as regards precipitation. The rainfall in June was abundant, and crops generally good. North and west of this area, however, the country was affected by the drought. In the Gull Lake district, especially, farmers have been setting out trees with the assistance of the Forestry Branch for a number of years, and now many plantations from 10 to 12 feet in height are in evidence. Generally speaking, plantations set out this season were a decided success, even the cuttings doing remarkably well, considering the dry season, in portions of the territory covered. Plantations set out in previous seasons were found in a generally thrifty condition and many cuttings from these were available locally, and were used by the planters and their neighbours for establishing new belts. In some of the driest parts of this inspection district it was frequently noted that the tree plantations were the only things on the farms that showed any growth at all. Evergreens seen showed good growth.

District covered by William Macdonald: Southeastern Saskatchewan.—South of the main line of the Canadian Pacific Railway and east of the third principal meridian, precipitation was nearly up to the average, though the earlier part of the growing season was dry. In this section conditions were favourable both for plantations set out and for the preparation of land for 1915 planting. Farther west and north, rainfall was scanty, greatly affecting the newly set out trees, and in many cases making it quite impossible to get soil in a proper state of cultivation for next season's planting; in this section many new applicants were not granted trees for this reason. Early frosts in August did some slight damage to new growth in the heavy clay districts south and east of Regina.

Evergreens seen in this district were showing most successful results. General interest in tree planting was much in evidence. Much more attention seemed to be given to the cultivation of garden crops and small fruits wherever plantations had been established. Standard apples, of the Hibernal variety, were ripened on the farm of Wm. Porter at Glen Ewen, Saskatchewan, one of his trees coming into bearing for the first time and maturing fifty-four good apples. Plum trees were seen growing near Halbrite, with such a heavy crop of fruit that the branches had to be supported.

District covered by D. Macdonald: Central Saskatchewan.—Over the greater part of this inspection district conditions were fair and, on the whole, 1914 plantations showed good results. In the Kindersley districts and townships 24 to 29, in ranges 15 to 28, conditions were most unfavourable on account of the extremely dry weather. Here newly set out trees, naturally, suffered considerably. Plantations set out in 1913 and in previous seasons showed good growth in spite of the adverse conditions in the district above mentioned. They nearly all showed evidences of good care and cultivation. Very beneficial effects were apparent on many farms from the earlier established plantations. Any evergreens seen seemed to be doing quite as well as the commoner broad-leaved varieties.

District covered by J. Reay: Northern Alberta.—Plantations set out in 1914 were not generally so successful as those of former seasons on account of extreme drought in certain areas. Plantations of 1913 made a decidedly good showing, and it was estimated that 95 per cent of the seedlings and cuttings set out in that year have become well rooted and made good growth during the past summer. Plantations set out previous to 1913 were also doing well and it was estimated that 90 per cent of trees and cuttings were growing well. In some cases, especially with willows and maples, slight injury had been caused from winter-killing where growth had been continued too late in the fall. This injury, however, is seldom severe, and the following season's growth, in the majority of cases, quickly makes up for it. No doubt this tendency to kill back will lessen as the plantations become better established and the new growth less rank and succulent. The area particularly affected by drought may be described, roughly, as lying in ranges 1 to 16, townships 24 to 32, west of the 4th meridian. Here cuttings of 1914 planting suffered about 25 per cent loss, and seedlings 15 per cent. Older plantations showed only lessened growth, and no evidence of actually killing out. North of these townships conditions, though better, were still poor, the losses in seedlings being probably 10 per cent, and in cuttings 20 per cent. In the district west of range 16 to the foot-hills, conditions were good and, as a consequence, 1914 plantings were quite successful, showing not more than 6 to 8 per cent of failures in the general stock planted. Many plantations were seen in northern Alberta 4 and 5 years old from 12 to 14 feet in height, enclosing gardens, orchards, and small fruit plots. Evergreens which had been sent out from the Indian Head nursery were frequently seen, and showed good progress. At least 85 per cent of those planted in the past three seasons were coming along well.

OFFICE WORK.

From November until the following spring the inspectors who are permanently employed return to the office at Indian Head and are engaged during the winter months in preparing plans, arranging distribution lists, etc.

The following is a tabulated statement of plans made and correspondence handled in the office in the past two seasons:—

—	April 1, 1913, to March 31, 1914	April 1, 1914, to March 31, 1915.
Planting plans prepared	3,109	2,628
Pieces of mail received	14,387	21,353
Pieces of mail sent out	21,122 (inc. 3,109 plans franked) [1]	26,856 (inc. 2,621 plans franked[1])
New files added	2,598	5,967

[1] This does not include bulletins, these being sent out from the head office at Ottawa.

EXHIBITS.

The usual exhibit at the Brandon summer fair was again put in shape, and, as in past seasons, created a considerable amount of interest.

NURSERY WORK.

Although the season was on the whole drier than usual, the growth of nursery stock was excellent. The lack of rain assisted greatly in keeping down weeds, while good cultivation evidently conserved sufficient moisture to bring the seedlings to maturity. Conditions for lifting and heeling-in the stock for winter storage were all that could be desired. During the past winter, however, we have had a very scanty snowfall, and the heeled-in stock has been fully exposed, but does not up to this date seem to have suffered any appreciable injury.

Areas devoted to the different varieties of stock were as follows:—

	Acres.
Broadleaved—	
Maple seedlings	23¾
Ash seedlings, 1 year old	21
Ash seedlings, 2 years old	25
Caragana seedlings, 1 year old	4½
Willow cutting stock	5½
Russian poplar stock	3
	82¾
Coniferous (Evergreen)—	
Transplant plots	10
Seed-beds	¾
	10¾
Total	93½
Sown in fall of 1914—	
Maple	12
Ash	23
Caragana	5
	40

The following stock is available for distribution this spring (1915):—

Broadleaved—	
Maple (1-year seedlings)	1,529,000
Ash (2-year seedlings)	938,000
Russian poplar (cuttings)	184,000
Willow (cuttings)	942,000
Caragana (1-year seedlings)	679,000
	4,272,325
Coniferous (Evergreen)—	
Scotch pine (4-year transplants)	37,760
Jack pine (4-year transplants)	26,475
Lodgepole pine (4-year transplants)	41,811
White spruce (5- and 6-year transplants)	79,919
	185,963
Grand total	4,458,288

Quite a quantity of this stock will be sent to the nursery station at Sutherland, Saskatchewan, for planting on the grounds there.

Collection of Seed.—The past year was a comparatively good seed year, though unfortunately, just before collecting commenced we experienced extremely severe wind storms which were general all over the west, so that in most sections the greater part of the seed was blown from the trees. Seed sufficient, however, for our requirements, was secured in the Qu'Appelle valley and at Portage la Prairie. The following amounts were collected:—

	Pounds
Caragana (from Nursery Station: clean seed)	763
Maple (from Qu'Appelle valley)	2,800
Ash (from Portage la Prairie)	1,455
Ash (from Qu'Appelle)	2,312
Ash (from Turtle Mountain)	320

Cones were also collected as follows:—

	Bushels
Jack pine (from northern Saskatchewan)	55
Lodgepole pine (from southern Alberta)	70

Seed distribution.—There were mailed to individual farmers, in lots of about one pound each, 254 packets of tree seeds as follows: maple, 81 lots; ash, 47; caragana, 126.

Conifer seed-beds and transplants.—There were sown 3,588 square feet of new seed-beds, as follows: white spruce, 1,872 square feet; Scotch pine, 624 square feet; jack pine, 624 square feet; lodgepole pine, 468 square feet. The stands of pine were as good as usual, but the spruce, which is slower of germination, on account of dry weather has not given as good results, the stand being only moderately good.

The following seedlings were moved to the transplant plots:—

Tamarack (2-year seedlings)	16,800
Jack pine (2-year seedlings)	69,478
Lodgepole pine (2-year seedlings)	23,642
Scotch pine (2-year seedlings)	32,256
White spruce (3-year seedlings)	92,102
[1]Siberian spruce (3-year seedlings)	13,230
[1]Norway spruce (variety *Borealis*), (3-year seedlings)	5,544
[1]Bull pine (Kamloops), (2-year seedlings)	2,440
[1]White pine (2-year seedlings)	3,984
[1]Siberian pine (2-year seedlings)	816
[1]Siberian fir (2-year seedlings)	5,400
[1]Common juniper (3-year seedlings)	1,547

[1]Experimental purposes.

EVERGREEN DISTRIBUTION.

In the spring of 1914 the following numbers of evergreens were sent out under our usual conditions at a nominal cost of $1 per hundred:

White spruce (5-year transplants)	32,800
Colorado spruce (6- to 8-year transplants)	1,845
Norway spruce (5-year transplants)	5,600
Jack pine (4-year transplants)	10,700
Scotch pine (4-year transplants)	14,800
Lodgepole pine (4-year transplants)	26,400
Total	92,145

These were sent out in 401 separate shipments: 63 to Manitoba, 250 to Saskatchewan, and 88 to Alberta. Weather conditions for planting evergreens were about the most trying that have been experienced since our distribution commenced. However, in spite of the extreme drought, the reports we have received from the individual planters are, on the whole, very satisfactory.

PERMANENT PLANTATIONS.

The permanent plantations have continued to make good growth though, perhaps not quite so much as in other seasons. The evergreen plantations and windbreaks are especially promising. The Scotch pine belts set out on the east of the nursery in the spring of 1906 are excellent plantations, the average height of the trees being now from 13 to 14 feet. The jack pine is another variety showing quick growth, and though not so ornamental as the Scotch pine, either as regards colour or habit of growth, still when planted closely for wind-breaks will, I am sure, give very satisfactory results. The lodgepole pine, while a native of Saskatchewan and Alberta, does not seem to show up so well as either the Scotch or jack pines.

The white spruce though somewhat slower in growth than either the Scotch pine or jack pine, is perhaps on the whole the best evergreen for general planting. The Colorado spruce appears to be the hardiest of all the varieties yet planted in the nursery, but is rather slow of growth for the first eight or ten years.

The tamarack and Siberian larch have both made good growth, but unfortunately the larch saw-fly has made its appearance in these plantations in very large numbers. This is a most destructive insect and, as it seems now to be spreading westward, we would consider it inadvisable to continue to recommend the tamarack or larches for prairie planting. This is very much to be regretted, as these varieties have up to the present given such great promise as being of rapid growth under prairie conditions, and producing poles and posts of considerable value. Endeavour will be made, if possible, to save the plantations already in the nursery, by spraying, but as our larch plantings now cover from 15 to 20 acres, this will be a considerable undertaking.

In regard to the broad-leaved varieties, the cottonwood is proving most disappointing. In past seasons the older trees seemed gradually to die out, and this winter (1914-15) many fair-sized trees which were in good condition have been very badly damaged by bush rabbits. In one plantation of about two acres, where the trees were about 16 feet high and from 2 to 3½ inches in diameter, nearly all have been completely barked to a height of about 2½ feet above the ground. Undoubtedly the majority of these trees will die, though they will probably sprout again from the ground.

The Russian willows and poplars are still making good progress in close plantations. The elm and ash, though slower of growth, are in splendid condition.

The native white birch is giving splendid results. This variety has proved to be a very rapid grower and, if it were not so difficult to procure seed and to propagate it in large numbers, this would be a splendid variety for more general planting.

The portion of the Russian poplar plantation, mentioned in my last report, which was cut for fuel in the fall of 1913, sprouted well from the roots, and by fall of 1914 there was a good even second-growth over the whole of the cut-over area, the average height of the stool shoots being about 3 feet 6 inches. The second growth on this plot now promises well and should, if anything, produce more fuel in less time than that cut off in 1913.

The following measurements were taken in October, 1914, in some of the older plantations of tamarack, Scotch pine, white spruce, and white birch:—

Variety.	Year Planted.	No. of Trees Measured.	Average Height.	Maximum Height.	Diameter at Breast Height.	
					Average.	Maximum.
			Ft.	Ft.	In.	In.
Tamarack	1904	278	19·68	23·4	2·91	3·87
Scotch pine	1906	600	11·50	14·8		
White spruce	1906	200	8·28	12·0		
White birch	1906	200	17·36	21·5	2·18	3·2

ORNAMENTAL GROUNDS.

The lawns and shrubs along the main entrance drive and around the different buildings have made considerable development. The evergreens, which were rather inconspicuous during the earlier years, are now commencing to show up to better advantage, and many of the faster-growing deciduous shrubs and trees have been thinned out to permit of their proper development. The herbaceous perennials and annuals, while making a good show, were hardly up to other seasons on account of the excessive heat and continued dry spells.

GENERAL FARM WORK.

Thirty acres of oats on backsetting were sown and harvested. As was general throughout the west, the crop, though good for the season, was much below the average, threshing out less than 40 bushels per acre.

About 14 acres were in rye grass for hay, which gave a fair crop considering the season, and an additional 20 acres were sown, as some of the older seeded land will be broken up. Thirty acres were summer-fallowed, and all the plots from which seedlings were removed were immediately reploughed and cultivated down and some reseeded in the fall.

About 3 acres of Russian poplar and willow cutting stock which had about run out was grubbed up and ploughed in the fall (1914).

PERMANENT BUILDINGS AND IMPROVEMENTS.

No additions were made to the buildings during the past season, but an electric lighting plant was installed during the winter to furnish light to all the stables, sheds, etc., and superintendent's residence. The plant is of sufficiently large capacity to supply any new buildings which may be required at any future time.

SUTHERLAND NURSERY.

Mr. James McLean was appointed as superintendent of the new nursery station at Sutherland, Saskatchewan, and assumed his duties on May 7, 1914. Mr. W. B. Guiton,

who had been acting superintendent up to that time, returned to his previous employment on the inspection staff at the Indian Head office.

The weather conditions at Sutherland were much more trying during 1914 than at Indian Head, and, although a large quantity of shrubs and stock for shelter-belts was sent up for planting, a good many failures resulted owing to drought.

A considerable area was sown to maple and ash seed, and planted to cutting stock, and it is hoped to have a good supply for distribution from this point in the spring of 1916.

Respectfully submitted,

NORMAN M. ROSS,
Chief of Tree Planting Division.

REPORT OF DISTRICT INSPECTOR OF FOREST RESERVES FOR MANITOBA.

WINNIPEG, MAN., June 10, 1915.

SIR,—I beg to submit herewith the following report on work done in the Manitoba Inspection District for the year 1914-15.

RESERVES.

There are in the inspectorate the following forest reserves: Riding Mountain, Duck Mountain, Turtle Mountain, Spruce Woods.

Proposed New Reserves.—The following areas are proposed as new reserves:—

Southeastern Manitoba, approximate area 230 square miles; Lake St. Martin, approximate area 234 square miles; Washow reservation, approximate area 648 square miles; Manigotagan reservation, approximate area 2160 square miles.

These areas have been examined and found to be strictly non-agricultural land. It is hoped that during the coming year they will be set aside as permanent forest reserves, and placed under proper supervision.

Changes in Reserve Boundaries.—On June 12, 1914, the west half of townships 24 and 25, range 27, west of the 1st meridian, were withdrawn from the Riding Mountain forest reserve and thrown open for entry. The majority of this land is now homesteaded, and the clearing of land and erection of buildings is progressing rapidly.

STAFF.

The staff in the district comprises the following: One inspector, four supervisors, three forest assistants, three stenographers, two chief rangers, seventeen permanent rangers, twenty-two summer rangers, and two herders during the summer.

FIRE PROTECTION.

During the year there were sixty-six fires on the four reserves (of which thirty-six were large and thirty small fires) as follows: Riding Mountain reserve, twelve large and twenty-one small fires; Duck Mountain, twenty large and five small fires;

Spruce Woods and Turtle Mountain, two large and two small fires each. The causes were as follows: Unknown, forty-one; railways, four; settlers, fourteen; logging, four; and carelessness, three. No fires occurred in April, and in the other months of the fire season the record was: May, 25; June, 9; July, 1; August, 16; September, 10; and October, 4. The total expenditure in fighting fires was $2,653, the greater part of which ($2,293) was spent in the Duck Mountain reserve, where the damage was $500. There was no financial loss on the three remaining reserves.

Riding Mountain Reserve.—As will be noted, the cause of the great percentage of fires has not been known. An effort is being made, however, to discover the causes more closely in the future that the protection may be more effective.

Another point worthy of note in the list above is the ratio of large and small fires. Of thirty-three fires, one-third were large fires. While this does not point to as efficient protection as we would like, still there is a marked contrast between the Riding Mountain and Duck Mountain reserves in this respect. The cause of this I would attribute to the more efficient protective measures on the Riding Mountain reserve, viz., trails, telephones, and lookout towers.

Duck Mountain Reserve.—The work which will be completed by autumn on the Duck Mountain reserve will add considerably to the facility with which a ranger can detect and reach a fire in this reserve. During the past there has been practically no passable road into the central part of the reserve and, consequently, it was impossible to arrive at a fire until it had made considerable headway.

The distribution of boxes containing fire-fighting tools at different points around the boundary of this reserve has proved very effective, as the settlers usually begin to fight the fire as soon as it is detected.

Spruce Woods Reserve.—There were only four fires on this reserve last year, the railroad being the cause of two of these. The Act of the Provincial Government making this reserve a game preserve has been a decided aid to fire protection, as now there is hardly any reason for people to travel on the reserve, and hence the number of fires is materially lessened. The erection of about two lookout towers on this reserve will later be taken up. These will make fire protection here much more effective, as will also cross fireguards, which matter is being taken up.

Turtle Mountain Reserve.—The lookout tower on this reserve, which is less than a mile from headquarters, is a great aid to fire protection here, as it overlooks all of the Turtle Mountain reserve except the eastern 3 or 4 miles, on which a fire can also be easily detected as soon as the smoke gets up about 200 feet above the ground. The system of fireguards and trails on this reserve has also proved very effective in reaching and stopping fires. The burning of hay meadows and an occasional fire caused by incendiarism seem to be the chief causes of fire on this reserve.

IMPROVEMENTS.

Riding Mountain Reserve.—The Clear Lake road built for the purpose of allowing motors to run to Clear Lake summer resort, has been well constructed. With a little maintenance, which is always required on a new road, this will be in first-class shape. The remainder of the roads, as described in the Riding Mountain reserve annual report of improvements have been done in a workmanlike manner. Some of these will also require maintenance for a few years to put them in first-class shape.

About 70 miles of telephone lines were erected last year, and I think the cost of $76 per mile fairly reasonable, considering the class of line constructed. This line has proved exceedingly useful in reporting fires, as well as in the general administration of the reserve.

The Elphinstone ranger station was built this year similar to the standard plans for ranger stations used on this reserve. This has been built on the prairie on the east shore of lake Audy, which is a fine site for a station. The building has been well constructed.

Considerable maintenance work has also been done on the other buildings in the reserve, as painting, etc., and all are in good condition.

Duck Mountain Reserve.—The buildings at Baldy mountain, viz., cabin and stable, were built at a very reasonable cost, and serve the purpose there very well.

The lookout tower at Baldy mountain was built of poles, cut near by, at a cost of $40. Of course this tower is not as substantial as a steel tower but considering the cost, I think it is well worth the money.

The platform on the Durban ranger station is also very serviceable on account of being accessible from the ranger's headquarters. A good view can be obtained from here and the platform proves very useful in detecting fires in this district.

The road building on this reserve, as on the Riding Mountain reserve, is considerably different from that on the Spruce Woods and Turtle Mountain reserves, on account of the dense timber which usually has to be cut, and also because of the gravelly soil and boulders. A good job has been made of all the roads built on this reserve during the past eyar.

Spruce Woods Reserve.—During the past year fireguards were ploughed along the greater part of the boundary of this reserve, which had not been previously protected in this way, except by fireguards within the reserve. These fireguards are proving very effective in stopping fires in grassland, which is the prevailing type in the Spruce Woods reserve.

The grazing enclosure built last year has also been a success, as it proves to the settlers in the vicinity of the reserve that the reserve is to be utilized by the public.

The new nursery has been ploughed, fenced, and subdivided into beds, and is in very fair shape.

The remainder of the improvement work on this reserve, consisting of maintenance of works previously constructed, has also been well carried out, leaving the buildings and old fireguards in good shape.

Turtle Mountain Reserve.—The policy of Supervisor Scott on this reserve of making trails and roads of extra width, so as to serve as fireguards, has proved very valuable. The use of an "in-throw" disc harrow to raise a crown on roads also recommends itself very highly for the construction of roads. After using the split-log drag on this a fine roadway is at once the result, and, after using this for a few years, the road will become the same as if constructed with a heavy grading machine. All the roads and fireguards on this reserve are in first-class shape. The maintenance work on buildings has also been well looked after, so these, as well, are in good condition.

SILVICULTURE.

Riding Mountain Reserve.—By far the greater percentage of timber cut under permit and under Timber Sales Regulations in the Manitoba inspection district, is cut on this reserve. This phase of the work has not been altogether satisfactory, partly because the supervisor left last December and the acting supervisor was not familiar with the work, and partly because of the frequent changes in the regulations which were not clear to the Crown timber agents making out the permits. Then the matter of getting the settlers to dispose of brush properly is more or less in the educational stage, and better results will be expected each year.

The areas on which green spruce should be cut will have to be gone into on this reserve. This matter will be taken up this summer. The trees to be cut will also probably have to be marked, as settlers cutting green spruce pay practically no attention to seed trees. This is a very important factor on this reserve, where spruce is the important tree over the greater part of the area.

Duck Mountain Reserve.—During the past year Forest Assistant Watt has spent considerable time in connection with timber sale work and permits, and has had some very good results. The men in this district are rapidly becoming educated to the idea of brush disposal. Next winter the method of having all brush burned as cutting proceeds will be tried and, I think, will work out very satisfactorily.

Spruce Woods Reserve.—That part of the Spruce Woods reserve north of the Canadian Northern railway and south of Sewell consists mainly of a park stand of scattered white spruce. During the last few years the seeds from the larger trees have spread over the area, so now there are a great number of young spruce coming up surrounding the seed trees. If protected from fires this area will, no doubt, in the years to come be entirely seeded from this source. The only timber being sold at present is that under a few settlers' permits for dead poplar.

Turtle Mountain Reserve.—During the past few years, since this reserve has been protected from fire, the scrub oak and poplar as well as considerable ash, have begun to cover the hills. A few years ago these hills were bare except for an odd tree, now they are rather densely covered with poplar and scrub oak. This oak, although rather scrubby, will in a few years be valuable to the settlers as fence-posts, and for other purposes for which a strong piece of wood is required.

NURSERY.

During the past year a new nursery plot was started northeast of the Shilo headquarters on the Spruce Woods reserve. This was fenced and the watering plant moved from the old nursery. A row of seed-beds was also made along the west side, and these are now seeded with spruce, jack pine and Scotch pine. The spruce, however, which were transplanted here, have been killed by the drifting sand. The pine transplants, though, are doing very well. The planting of wind-breaks around the nurseries will aid in preventing the sand from drifting. This planting is being gone on with at present.

The Scotch pine plantation is doing very well, and will probably have to be thinned out as the plants are at present too thick to thrive.

GRAZING.

Spruce Woods Reserve.—During the past year a fence was erected enclosing about 13 sections of land south of Brandon Junction. Cattle and horses are taken into this for the season at the rate of $1 per head. This area will probably support about 400 or 500 head of stock, and it promises to be so popular that it is very probable that next year a similar enclosure may have to be constructed at the west end of the reserve.

Turtle Mountain Reserve.—The grazing enclosure on this reserve is rapidly proving increasingly useful to the farmers in this vicinity. During the past year about 200 cattle were pastured, and indications are that this will be much more than doubled during the present year. The farmers will no doubt continue to graze more stock each year until the pasturage is fully stocked.

Riding Mountain Reserve.—Last year some 200 head of stock were grazed on the west end of this reserve, and applications were received to graze large numbers of stock around lake Audy and Clear lake, but satisfactory arrangements could not be arrived at, and the matter had to be dropped. It is likely that open grazing will be taken advantage of here within the near future.

SUMMER RESORTS.

There is now a summer resort on each of the reserves in Manitoba, except the Spruce Woods reserve.

Clear Lake Summer Resort, Riding Mountain Reserve.—The first effort at improvements was made here last year when a motor road was built from the boundary of the reserve to the lake. A considerable number of people availed themselves of the opportunity of camping here last year. Last August some forty motorists, chiefly members of the Brandon Auto Club, as well as a few from Minnedosa and Neepawa, took a trip to the lake, and all were well pleased with the proposed summer resort. It is expected that during the coming season it will be still more popular, and that a considerable number of lots will be taken up.

Madge Lake Summer Resort, Duck Mountain Reserve.—This summer resort, which will be utilized by the citizens of Kamsack, Benito, Pelly, and Durban and surrounding towns, is destined to become very popular. So far seven lots have been leased, and applications for a considerable number are being received. During the present summer (1915) it is expected that in addition to being used by campers, as indicated above, several picnics and gatherings will be held at the lake.

Lake Max Summer Resort, Turtle Mountain Reserve.—This summer resort has been in use by the citizens of the surrounding country for the last few years, and has been improved considerably more than the others. There are now eighteen lots leased, and about ten cottages built. Several more cottages are planned, as are also a new dock, refreshment booth, pavilion, etc. During the summer there will be a number of picnics held there, and besides several hundred people will visit the lake on Sundays and holidays through July and August. Altogether it is a very popular summer resort.

RECONNAISSANCE.

During the past summer, Messrs. Watt, Ketchum, and German made a reconnaissance of the eastern part of the Duck Mountain reserve, that being the part not covered by Mr. Newman during the previous summer. To date the report on this work has not been received here. Making plans for improvements and the management of the cutting of green spruce will be facilitated when this report and a revised map are received.

In the vicinity of lake St. Martin, between lake Manitoba and lake Winnipeg, Mr. Prowd made a resurvey of the country which was covered the previous summer by Mr. Greig, and two areas have been set aside here as proposed reserves.

Mr. Prowd also covered a large area of the east shore of lake Winnipeg, from the Winnipeg river north to the Manigotagan river, and this has also been set aside as a proposed reserve.

FISH AND GAME.

During the past year some 220 pickerel were secured from Winnipegosis and, with considerable trouble, were taken to Madge lake. At least 210 of these were placed in the waters of that lake alive, and it is expected that in a few years there will be a good supply of these fish available there to provide sport for campers and others visiting this lake.

About four years ago lake Max was stocked with perch, and the first perch to be caught were secured last summer. No doubt during the coming summer there will be still larger numbers caught.

During the past summer the game preserve in the Riding Mountains reserve has been made smaller, so now it covers an area of 9 miles in width and 24 miles in length. The game reserves in the Duck Mountain, Turtle Mountain, and Spruce Woods reserves still remain the same.

EDUCATION AND PUBLICITY.

The exhibit in the Industrial Bureau at Winnipeg has attracted considerable attention. It surprised many people that specimens such as are on exhibition could be obtained from trees growing in this province.

The improvements at the three summer resorts, viz., lake Max, Clear lake, and Madge lake have also brought the work to the attention of the people, and a great many who would not otherwise have known the work the branch is doing, have expressed their appreciation while visiting these summer resorts during the summer.

Respectfully submitted,

F. K. HERCHMER.
District Inspector.

REPORT OF DISTRICT INSPECTOR OF FOREST RESERVES FOR SASKATCHEWAN.

PRINCE ALBERT, SASK., March 24, 1915.

SIR,—I beg to submit the following report on the Saskatchewan Inspection District for the fiscal year 1914-15.

INTRODUCTION.

The field work in the province of Saskatchewan comprises fifteen forest reserves, with an area of approximately 9,890 square miles; the Battleford and Prince Albert fire-ranging districts, covering the unsettled country outside of the reserves from approximately township 49 north to the Churchill river; and the work of fire protection on all the railroads throughout the province.

In administering this work special attention has been given to the following: first, personnel; second, improvements; third, equipment; fourth, fires; fifth, timber permits; sixth, grazing; seventh, planting; and eighth, game.

The above branches of the work are enumerated in order of importance. It has been the aim of the department to secure an efficient staff who should live on the reserves. This necessitated the construction of comfortable headquarters, and, as soon as this work was completed, sufficient equipment was purchased to carry on all classes of reserve work to the best advantage. Very little telephone work was undertaken, but it was the idea that as soon as the houses, lookout towers, and roads were nearly completed, all the ranger stations should be connected by telephone, and if possible to have the supervisors' headquarters connected with the nearest public telephone line.

PERSONNEL.

The personnel of the Forestry Branch in the province of Saskatchewan has been greatly improved during the past year, and the staff has given entire satisfaction

except in a few instances. The following table gives the force employed during the present fiscal year and the additional appointments which will be needed to complete the staff:—

—	Staff 1914-15.	Additional Appointments needed in 1915-16.
Saskatchewan Inspection Office	1 district inspector. 1 assistant to district inspector 1 accountant. 2 stenographers.	None.
Railway Fire Ranging	1 divisional fire inspector. 3 railway fire guardians.	1 railway fire guardian.
Forest Reserves.		
Beaver Hills	1 ranger in charge. 1 labourer.	None.
Big River	2 rangers.	1 forest assistant, 2 rangers (yearly). 1 ranger (6 months.)
Dundurn	None.	1 ranger.
Elbow	1 ranger.	None.
Fort à la Corne	1 ranger in charge. 2 rangers.	1 labourer.
Keppel	None.	1 ranger.
Manito	1 ranger.	None.
Moose Mountain	1 ranger in charge. 1 ranger. 1 labourer.	None.
Nisbet	1 ranger in charge. 1 ranger.	1 labourer.
Pines	1 ranger in charge. 1 ranger. 1 labourer.	None.
Porcupine-Pasquia	1 supervisor. 1 forest assistant. 1 forest clerk. 3 rangers (yearly) 6 rangers.	5 rangers (yearly). 4 rangers (6 months). 1 forest assistant.
Seward	None.	1 ranger (6 months).
Sturgeon	2 rangers.	2 rangers (yearly).
Steep Creek	None.	1 ranger.
Fire Ranging Districts.		
Battleford	1 chief fire ranger. 10 rangers. 2 assistants.	1 assistant.
Prince Albert	1 chief fire ranger. 18 rangers.	(Reduced by 2 rangers). 3 assistants.
The Pas	1 chief fire ranger. 15 rangers.	None.

The supervision of the work on the Big River, Sturgeon, and Porcupine-Pasquia reserves during the fire season of this fiscal year was carried on by men employed as fire rangers, and the forest reserve work as such was not started until the close of the fire season, consequently the above table gives only the men working on each reserve at the end of the fiscal year. The rangers working thereon during the fire season are included in the personnel of the fire-ranging districts. The changes recommended for the coming year in the fire ranging force are due to the fact that part of the areas will be included in the forest reserves for the coming year, although in some cases new fire-ranging districts have been added in the north country. In the Prince Albert district the rangers have been reduced by two; but three Indian assistants have been added owing to the fact that two men are needed on each patrol in the more northern districts.

The Pas fire-ranging district has been transferred from Saskatchewan inspection to Manitoba inspection, and that part of The Pas district which was in the province of Saskatchewan has been added to the Prince Albert fire-ranging district, and will be supervised during the coming season by the chief fire ranger at Prince Albert.

The results obtained in the work depend almost entirely on the reserve field staff. The most suitable men have been appointed, except in a few instances. Practically the entire staff are interested in the work and are giving the department faithful service, and it is due to this fact that a good showing has been obtained on most of the reserves.

IMPROVEMENTS.

The improvements on the various reserves at the end of the fiscal year are as follows:—

Beaver Hills Forest Reserve.—Practically the entire boundary line has been cut out 28 feet wide except the south boundary where the old fireguard is still in use, which was cut some years ago. This old fireguard is in very poor condition, and the south boundary fireguard should be cut out as soon as the work will allow. There are also one ranger house, one stable, one wagon shed and one well. The roads have also been improved. One lookout tower has been ordered for this reserve, and will be completed in the near future.

Fort à la Corne Forest Reserve.—Three ranger houses three stables, and two wells. Several miles of road and trail have been cut out. Two small cabins for stopping places have been authorized. Two lookout towers have been ordered, and will be completed in the near future. Orders have been given to construct a wooden lookout tower at the River Cabin.

Moose Mountain Forest Reserve.—Two ranger houses, and two stables. Several miles of road and trail have been cut out and improved. Some of the boundary has been surveyed and several miles cut out. Two lookout towers have been ordered, and will be erected this spring.

Nisbet Forest Reserve.—Two ranger houses and two stables, one lookout tower constructed and one ordered. Material has been purchased for two small stopping places, and the headquarters house has been connected by telephone to Prince Albert. There will be approximately 65 miles of boundary line cut out 25 feet wide at the end of this year.

Pines Forest Reserve.—Two ranger houses, two stables, one ranger cabin, one ranger stable, one wagon shed, one tool shed, one steel lookout tower and one wooden lookout tower. One steel lookout tower has been ordered, to be erected this spring, and two pastures have been laid out. Approximately 10 miles of road and 5 miles of telephone line, have been constructed and approximately 40 miles of boundary line cut.

Porcupine-Pasquia Forest Reserve.—Six ranger cabins and six stables. Approximately 120 miles of trail have been cut out. One supervisor's house, one clerk's house, and one ranger cabin have been authorized, and the work is to be started on them this year.

Big River Forest Reserve.—Two ranger cabins and two stables. Material has been ordered for two more cabins, and this will be hauled to the building sites this year.

Sturgeon Forest Reserve.—Two ranger cabins and two stables. Material has been ordered for two or more cabins and stables, and will be placed at the building sites this season. One wooden lookout tower was constructed on this reserve by the fire rangers last season and several miles of trail were blazed out.

The Beaver Hills, Moose Mountain, Pines, Nisbet, and Fort à la Corne reserves have all the ranger quarters constructed, all the lookout towers are erected or ordered, and the other improvement work is well under way. All the ranger houses should be connected with a telephone line.

The improvement work is well started on the Porcupine-Pasquia, Sturgeon, and Big River reserves, but no improvement work has been done on the Keppel, Dundurn, Manito, Steep Creek, or Elbow reserves. The construction of ranger headquarters on these reserves should be started as soon as possible.

In locating reserve houses or cabins the first aim has been to have them on the reserve and as near as possible to the centre of the district, based on the location of the work within the district; the second, to have a good lookout point within three-quarters of a mile of each cabin; and the third to have water close to the house, with pasturage and hay as convenient as possible.

Close supervision should be given to all improvement work, so that it will be done in good shape and at normal cost.

EQUIPMENT.

Practically all of the reserves have been supplied with equipment, which includes fire-fighting tools, carpenter tools, wagons, sleighs, harness, brush mowers, and so forth. Only such tools have been purchased as are absolutely necessary in carrying on the work except the fire-fighting tools, of which sufficient have been ordered to cover emergency cases. The rangers are, in most cases, located some distance from settlement and all headquarters have been equipped with carpenter tools and so forth, which are needed in all ordinary carpenter or repair work; and sufficient wagons, ploughs, etc., have been purchased, so that the work can be handled without unnecessary travelling on the part of the rangers.

FIRES.

The past season was very dry and the fire danger was great as compared with the previous year, but there was very little damage from fire in this district except in two cases. On the Porcupine reserve a fire was burning, mostly in the cut-over areas, during a large portion of the season, and a large amount of damage was done in the young growth. Large areas were burned over at Beaver lake, due to carelessness of prospectors and to the inefficiency of the fire rangers in that district. The two main causes of the large amount of damage done to timber in this district were: first, lack of brush disposal in previous years; and, second, inefficiency of fire rangers. The country is rapidly settling up, and there are a large number of portable mills operating in addition to the three large mills located at Big River, Prince Albert, and The Pas, respectively. No brush disposal has been undertaken by the operators on any of the cut-over areas; consequently, in all the timbered country there is a large amount of slash and débris on the ground to feed any fire that may start, and

practically all the cut-over areas have been burned in the past. It is absolutely impossible to stop a fire on these cut-over areas when once it is started, on account of the large quantity of débris, and the fire usually obtains such dimensions that it will spread to areas not cut-over. But it is found when a fire starts on an uncut area, that it spreads very slowly and, if caught within a reasonable period after starting, it is easily extinguished. It has been ascertained that the brush from logging operations can be easily disposed of as the cutting proceeds, and I would recommend that this matter be taken up with the Timber and Grazing Branch, with the request that all brush be burned at the time the cutting takes place. This would be of advantage to the lumber companies, as well as a saving to the country at large. A good example of this is found on the Big River limits, where fire occurred some four years ago. The damage to the logs cut and in the lake, through the decrease in grade, would far more than pay for the cost of brush disposal on the entire area cut over. This is to say nothing of a block of some 150,000,000 feet that was burned which had not been logged, and which is a complete loss both to the licensees and to the Government.

The damage done by fires depends to a large extent also on the efficiency of the ranger force. If the rangers appointed are good, conscientious men, practically all the fires can be caught in the early stages, and very little damage will be done. The large quantity of timber destroyed at Beaver lake was due practically to the lack of interest taken by the ranger in that district during the past season. There were several small fires burning for several days, and the ranger made no attempt to extinguish them. A strong wind finally developed, the fires increased very rapidly, and the timber on a large section of the country was completely destroyed.

A system of fire protection is being rapidly developed, and destruction from fire is decreasing. The forest reserves are being divided into districts and a ranger is located as near as possible to the centre of each district, with a good lookout point. Roads and trails are being opened up, lookout towers constructed, fire equipment purchased, and now practically all the old reserves are ready for a system of telephone lines connecting the supervisors with all the rangers' headquarters. The boundary lines on many of the reserves in settled districts are being cut out 25 feet wide, and on the more isolated reserves a pack trail is being cut around the boundary line. When this work is completed a very good system of fire protection will be in force on all the reserves in the district.

It will be very difficult, however, to reduce the fire danger to a minimum until the burning of the brush on logging operations is enforced by the department. This question of brush disposal has been talked over with all of the woods foremen for the big companies operating in the district, and with a large number of the small mill men; they all agreed that it could be done with very little expense, and they informed me that they would be willing to comply with the regulations and burn the brush as the cutting proceeded, provided every mill man operating in the district was compelled to do likewise. In this I agree, as it would be unfair to compel lumbermen operating in one section of the country to burn their brush while allowing those operating in another section of the country to leave the brush scattered over the ground. This is one of the most important questions in the protection of timber in the Dominion, and a system of brush disposal should be enforced on all lumbering operations as soon as possible. Until this is done it will be impracticable to conduct any planting operations or to operate along silvicultural lines, as the danger from fire, due to the débris left on the ground, is too great.

TIMBER PERMITS.

The regulations enforced on all cutting operations on all forest reserves have been as follows:—

That all brush is to be burned as the cutting proceeds, stumps to be cut not higher than 12 inches, and all tops fully utilized; saw-timber down to 6 inches, and cordwood to 2 inches.

It was found that the brush could be burned easier and cheaper at the time of cutting than later and it has been the aim of this branch to get the permittees to burn the brush as it is taken from the trees. We have been quite successful in this work. The best results have been obtained on the Nisbet reserve. Good results, however, were secured on the Fort à la Corne, Pines, Porcupine-Pasquia, and Big River reserves. The conditions on the Moose Mountain, Elbow, Manito, Keppel, and Beaver Hills reserves are not first-class, but fair results were obtained on these reserves. Practically very little work was done on the Sturgeon reserve, but good results were obtained on the small amount of work that was done, especially by the rangers.

The results of the work depend entirely upon the ability of the ranger and the interest which he takes in the work. It is absolutely necessary that the ranger be on the work at all times, and give close supervision. If this is not done the work of the permittees is very poor. This is new work for most of the rangers and, where they do not understand it, it is hard for them to show the permittees; consequently, the men who are not familiar with the work have secured poorer results than the rangers who have had a year's experience. I feel that the brush disposal is one of the most important features in the cutting operations in this district. It should be enforced on all reserves and on all Dominion lands outside of the reserves.

GRAZING.

The new grazing regulations went into effect at the beginning of the fiscal year, and the owners of stock living in the vicinity of the reserves are taking advantage of the opportunities to secure a permanent range. Care must be taken, however, in dividing up the range among the various owners of stock. I found the best way to handle the small reserves was through local stock associations, composed of all the owners of stock living in the vicinity of the area which is to be used by the association. It is necessary to fence the forest reserves, especially the small prairie reserves, and the larger the pastures the more suitable are conditions for all concerned. In forming associations and fencing large areas the cost per head is smaller, the stock have a larger area and do not injure the range so much as in small pastures. The stock are less liable to injury and, as a general rule, are always in better condition. Where it is necessary to allow the stock-men to fence small breeding pastures, these pastures have been located, where practicable, adjoining the quarter-section owned by the applicant, or adjoining the boundary of the reserve. These pastures, as a general rule, consist of only a quarter-section, the intention being that the rest of the stock should be run at large on the reserves within the larger pastures. In granting the fencing permits care has been taken to have the reserves divided as far as possible into natural subdivisions, with an equal division of water, so that the pastures will be permanent. The water question is a very important one, and should be carefully looked into before any fencing permits are granted.

One stock association has been organized, and it is fencing approximately 40,000 acres this spring on the Manito forest reserve. The stock-men in several other localities have notified this office that they intend to organize associations and fence portions of the reserves. As a general rule, all the stock-men are well pleased with the regulations and feel that the department, through the grazing regulations on the forest reserves, is supplying a long-felt need of the small stock-men in the province.

The good-will of the owners of stock and the permanency of the stock-raising industry on the reserves depend on the following:—

1. That each and every owner of stock, living in the vicinity of the reserves, is given the same opportunity to use the reserves as his neighbours. In forming local stock associations, I impressed upon the members that they must allow all legitimate owners of stock in their vicinity to become members at any time, provided they were willing to abide by the rules of the association as approved by the department: and that the department would not grant permits within the pastures fenced by the associations to any persons who were not members of the said association;

2. The permanency of the range is one of the chief considerations, and unless the department can guarantee to the owners of stock that they will be assured, under all reasonable conditions, of their range, the surplus forage within the reserves will not be used for some time. The owners of stock are required to invest a considerable sum of money in starting, even on a small scale, and a permanent range is an absolute necessity. The department should make every effort to give the stock-men confidence in the industry by assuring them a permanent range, provided they comply with the regulations;

3. A large part of the owners of stock in this locality depend on wild hay for winter feed, and it is very necessary that they have assurance that their hay meadows will be permanent. It is recommended that the Government give them every assurance that they will have prior rights on all their hay meadows, so long as they live up to the regulations.

When the owners of stock become assured that the department is working on the above lines, I am sure that all our reserves will be fully stocked within a short period. At the present time, large numbers of grazing permits are being issued on the Manito, Elbow, Seward, and Dundurn reserves, and to a smaller extent permits are being issued on the Porcupine-Pasquia, Beaver Hills, Big River, and Keppel reserves. No permits have been issued as yet on the Fort à la Corne or Sturgeon reserves. Several inquiries have been received from large outside concerns in regard to the grazing conditions on the Sturgeon, Porcupine-Pasquia, and Beaver Hills reserves, and I feel that in a short time class 3 permittees (as outlined in the regulations) will take up all the range not now occupied by classes 1 and 2.

PLANTING.

The small prairie reserves were gone over last season by Mr. L. Stevenson, who made planting plans for the same, and I would advise that a small start, as recommended in these plans, be made as soon as possible, as many of the settlers living in the vicinity of the reserves are very anxious to see planting operations commenced. In many instances the settlers are now going from 40 to 60 miles to timbered areas for fuel.

The department also has a small nursery at the Pines reserve, where there are several thousand 1- and 2-year-old plants of various species. It is intended that small areas of 2-year-old trees will be planted this season and the remainder placed in transplant beds. Careful experiments should be made with these species in various conditions in the reserves and a record kept.

GAME.

All the forest reserves in the province of Saskatchewan have been created game refuges by the Provincial Government, and all rangers have been appointed honorary game guardians by the same authority. The rangers can give adequate protection to the game without interfering to any great extent with their other work, and, where the reserves have been organized, good results have been obtained with very little complaint from the public. On the large reserves, where the organization was not complete, good results have been obtained only in districts where the rangers have been on duty. As a whole, the plan is working out well and will continue to do so, so long as the proper interest is taken in the work by those in authority.

The large reserves comprise too great areas to be made permanent game refuges, and, as soon as the organization on the reserves is complete, I would recommend that small areas, of approximately nine to sixteen townships, be set aside as game refuges. The Porcupine-Pasquia reserve will probably need about three such game refuges, and the Big River reserve one. The remainder of the present reserves should be retained intact as game refuges.

The protection of the game is an important matter in this province, and I would advise that the department use every effort to co-operate with the provincial authorities in such protection.

Respectfully submitted,

G. A. GUTCHES,
District Inspector.

REPORT OF THE DISTRICT INSPECTOR OF FOREST RESERVES FOR ALBERTA.

CALGARY, May 12, 1915.

SIR,—I beg to submit my annual report as District Inspector of Forest Reserves for Alberta. As the administrative work of the Forestry Branch in this province is divided into three distinct branches, the report will be given under three distinctive titles, namely, Forest Reserve Administration, Fire Ranging, and Railway Fire Protection.

FOREST RESERVES ADMINISTRATION.

Personnel.—I took charge of the district on September 3, 1914, when my predecessor, Mr. Millar, resigned to take up work at the Forest School in Toronto. I came to the district in May, 1914, however, and from then until September acted as assistant district inspector, carrying on at the same time a supervision of the fire-ranging and railway protection work in this province, which had previously constituted part of my work as inspector of fire ranging. It had been hoped that I would be able to spend the greater part of last season in getting over the various reserves in the district. These plans, however, were seriously upset by the occurrence of numerous large fires; and also, owing to the fact that the assistance in this office was seriously limited, extensive field trips which might otherwise have been taken were curtailed. I was, however, able to cover the greater part of the Cypress Hills reserve, the southern half of the Crowsnest, part of the north half of the Bow River forest, and very small portions of the Clearwater and Brazeau forests. All the reserve offices, with the exception of the Lesser Slave reserve, were visited on several occasions. An extensive inspection trip was made by Mr. Millar on the south half of the Clearwater forest during the months of May and June. This trip was made, however, prior to the construction of the improvements of the season of 1914.

The staff of the inspector's office was essentially the same as in previous years, namely, an inspector, an accountant and a stenographer. As previously intimated, however, there was an assistant for a few months during the summer. On the forest reserves and in the district office there was employed, in addition to the inspector, a total of about 280 employees. During the year there were eight men who acted in the capacity of forest supervisor. Of these, however, two were employed for a period

of less than six months. The total number of supervisors at any one time was six, an increase of two over the previous year. These additions were on the Lesser Slave and Cypress Hills forest reserves. The former had not previously been under forest reserve administration, so that the appointing of a supervisor to the Lesser Slave reserve was a distinct addition to the staff of previous years. On the Cypress Hills reserve there had been previous supervision but the position had been vacant for a period of about two years. On the Clearwater forest, Mr. J. W. McAbee, forest supervisor, resigned on June 30, his place being taken by Mr. C. H. Morse, who supervised the forest until October, when Mr. A. E. Austin, the present incumbent, assumed his duties as supervisor of the forest. It might be further stated that the Athabaska forest was handled by Mr. S. H. Clark, also supervisor of the Brazeau forest, but as this arrangement was not satisfactory, owing to the immense size of the two forests, and also to the fact that the headquarters are rather widely separated, it has been arranged to bring the Athabaska forest under the definite charge of a forest supervisor for the next fiscal year.

There were altogether eleven forest assistants employed during the fiscal year. Of these only three held office for the year; four were employed for a period of about eight months; while four served for less than six months. One of the forest assistants, Mr. F. D. Brown, was promoted to supervisorship in charge of the Cypress Hills forest reserve. Mr. F. McVickar, formerly attached to this office, resigned early in the year. Two surveyors were employed for a portion of the year, Messrs. T. H. G. Clunn and A. Gorman. To assist these men on their surveys fifteen men were employed, consisting of field assistants, axemen, packers, and cooks. There were seven clerks employed in the district, one of whom remained for a period of only one month. The greatest number of clerks at any one time, therefore, was six, there being two in this office and one each on the Crowsnest, Bow River, Clearwater, and Brazeau forests. Altogether forty rangers were employed on the forest reserves, twenty-five being permanent men and employed for the greater part of the year, while fifteen were temporary or assistant rangers, and were employed for periods up to six months. In addition to the rangers there was a temporary labour force of about 198 men employed for various periods, nearly all under three months in duration. It may be said that this last force comprised the total number of employees used for improvement work. Over and above the foregoing staff there was also employed a very large number of temporary fire fighters for periods running from a few hours to about two weeks. Some hundreds of men were thus employed in fire fighting.

Of the employees indicated in the preceding paragraphs it may be stated that a number enlisted for service at the front: two forest assistants, Messrs. G. E. Bothwell and W. A. Delahey; three permanent rangers, Messrs. W. Lyndon, P. Leman, and G. Fuller; and two or three temporary rangers. Also, a considerable number of the men who were employed in a temporary capacity are now with the forces in training or at the front.

It is with regret that I report the death by drowning of Ranger Elmer J. House on the Clearwater forest. Mr. House lost his life while fording the Saskatchewan river at the mouth of Mire creek. He was on active duty at the time, and his being so emphasizes the fact that the life of a forest ranger is by no means devoid of chance and danger. It further emphasizes the necessity for providing suitable crossings for these large rivers in order that they may be crossed with a reasonable degree of safety during high-water periods.

In discussing personnel conditions it is merely necessary that I should refer to the previous reports by my predecessor. My experience here and in other parts of the service would lead me to endorse his remarks. My opinion is, however, that in some respects the conditions may perhaps be a little better than they were a year or two ago, although I am just as certain that fundamental changes must be effected if it is hoped to reach a genuine state of efficiency. It is quite true that in point of

numbers our technical staff is wholly inadequate, but there is another underlying cause for deficiency in technical work. We had, during the year, a technical staff of ten men, one the inspector, and four acting in the capacities of supervisors. While the technical supervisor should at no time lose sight of the technical aspects of his work, it is obvious that, in directing operations on a reserve containing anywhere from one to three million acres, a supervisor has his hands quite full in dealing with the many administrative problems, not necessarily technical in nature, which come up; and he is not, therefore, in a position to devote a great deal of time to technical problems. It would appear, then, that the work in this direction would fall to the forest assistant. It follows that, in order to develop technical work on a reserve of the size indicated above, a forest assistant would not have much time to devote to other than technical work. Not only is the technical staff wholly inadequate, however, but the forest assistant in the service at the present time is called upon to do a multitude of things which in reality should be carried on by the properly qualified forest ranger. This situation necessarily results in considerable neglect of the technical phases of the forest administration on the reserves. The qualifications of the ideal forest ranger have been the substance of many reports, so that it is unnecessary to devote time or space to a discussion of them here. It may be said, however, that the properly qualified forest ranger, as he is known in other countries, is characteristically a scarce member here. I do not wish to convey the impression that we have no good rangers, but rather that we have but few men in the service who might be said to grade favourably with what a forest ranger ought to be. It has previously been pointed out that this is due to two direct causes, for neither of which the forest ranger is responsible. In the first place the fundamental system of employment is not such as to give stability to the organization nor encouragement to the individual. It is well recognized that permanent success in any business is in large measure dependent upon stability of organization. It is only by having stability that one can apply with sufficient force the lessons learned by previous experience. If you have not stability of organization, previous experience does not play the important part which it ought to play, and as a result many set-backs occur. If a man does not feel that there is stability within the organization of which he is a member, it is evident that he cannot be expected to display the same interest which would be in evidence if he were to feel himself a live part of a live organization concerned in the attainment of one big object—in our case rational forest management. In the second place, a man must have encouragement, if his interest is going to be held directly to his work. Stability is encouragement to the individual man; as also is recognition of merit. There really cannot be stability without at least some recognition of merit in the individual member. It is evident, therefore, that in order to acquire such stability it is necessary that merit should be the basis of employment both in entering and holding office in the service. No man should be allowed to enter the service without having several most important qualifications. Some of these qualities are features of the man's physical and moral character, while others are features of his experience. At the present time it should not be difficult for a man to qualify for the position of forest ranger, but this is solely due to the fact that sufficient advance has not been made in the technical administration of our forests. Eventually it will be necessary that a man should have a good many more qualifications, these, necessarily, being along technical lines, than he has at the present time. The only reason why we cannot consistently require such qualifications at present is that no means has been provided for developing men of this standing. In other words, the facilities and benefits obtained by the establishment of a first-class ranger school have not as yet been provided for. To merely provide a ranger school, however, would not altogether solve the difficulty, for attendance at such a school would necessarily mean the expenditure of time and money by the person desiring to enter the service. Before undertaking this expense of time and money, therefore, a man must be reasonably certain that his outlay would be an

investment which would be the means of giving him permanent employment and income. Under the present system of employment the outlay would be a mere speculation. The provision of proper ranger school facilities, and employment and promotion on the basis of merit, therefore, go hand in hand as necessities for a proper advance in personnel conditions.

It may be stated that there is in the service at the present time a considerable number of men who have all the marks of the properly qualified forest ranger, except this special training which could be secured at a ranger school. Many of them, I am sure, would be glad indeed to take advantage of facilities which such a school would offer. With some men only a very short course of training would be necessary, while with others it might be longer; but in all of them who would be prepared to take such a course it would instil a new interest with most beneficial results to the service. The main function of a ranger school, however, would be to provide a specially qualified class of men from the ranks of which new employees could be drawn. The staff of rangers at the present time is not sufficient to provide adequate protection, and it behooves us to make provision for filling up new positions that will develop with capable, interested, and well-qualified men.

BOUNDARIES.

No new reserves were created in the Alberta inspection district during the past fiscal year, the only addition to the total reserved area being certain additions to previously existing forest reserves. A total area of 25¼ square miles was added to the Cypress Hills forest reserve. Previous examination of these lands had shown that they were best adapted to forest purposes, and a wise move was made in finally adding them to the eastern block of the Cypress Hills reserve. Various parts of these additions, however, are rather badly broken up or scattered, with the result that it will take a little time to bring them under the same intensity of administration which is applied to the rest of this reserve. It appears that there are still a few areas which might further be included, which would have the effect of rounding off the boundary which, at the present time, is very irregular in some places. The only other addition to reserves in Alberta consisted in the reservation of small areas for administrative site purposes on the Athabaska forest and Lesser Slave reserve. Great changes were made, however, in the areas of the Crowsnest and Brazeau forests. By Order in Council dated June 24, 1914, the Crowsnest was reduced by approximately 410 square miles, the reduction being made to provide for the addition of this territory to the Waterton Lakes park. This reduced the total area of the Crowsnest by approximately one-quarter. By the same Order in Council the Brazeau forest was reduced in area by over one-half, this latter change being for the purpose of enlarging the Jasper park. It is unnecessary to say that these large reductions had a very decided effect on administration. In both these extensions the boundary defined by Order in Council was such as to somewhat seriously interfere with the administrative units of this branch. It is greatly desired, therefore, that some readjustment of these boundaries should be effected which will adequately serve the requirements both of the Parks Branch and the Forestry Branch.

A total area of 949 square miles, which had previously been given rather a cursory examination and had been set aside as a temporary reserve, was examined in detail by a party working under the direction of this office. The purpose of these examinatons was to determine the relative value of the land for agricultural or forestry purposes. It was found that this area, 878 square miles was suited only for forest reserve purposes and, hence, recommendations have been made for the permanent addition to the Brazeau forest of 808 square miles; to the Clearwater forest, 63 square miles; and to the Bow River forest, 7 square miles. In addition to these,

several sections have been recommended for addition to the Crowsnest forest to provide for rounding-off and more clearly defining the boundaries in some parts of this forest. An extensive reconnaissance survey was also made by Mr. A. B. Connell in the Pelican Mountain country, but as this work was carried out under the direction of the head office it is unnecessary for me to refer to it here.

The boundary survey work initiated in the season of 1913 was to a certain extent continued during the summer of 1914. It has previously been explained that the boundary survey consists of a detailed examination of the lands for at least a mile on each side of the actual boundary line, with a view to providing this office with definite information with regard to timber and grazing existing on the border of the reserves. Altogether 98 miles of boundary, 86 miles in the Bow River forest and 12 miles in the Crowsnest forest, were examined during the past season, the actual boundary line being clearly defined by means of monuments and posters. Such posters were put up at the intersection of all section lines with the reserve boundary, and also at the intersection of trails with the boundary. This serves the purpose of thoroughly informing all persons who may be travelling the country as to the location of the boundary.

IMPROVEMENTS.

The construction of improvements throughout the district proceeded along similar lines to the work of the previous year. Although the amount of funds available for improvement work in the district was not by any means sufficient to provide for a completion of improvement plans which had been made, considerable progress was effected. No radical changes in the form of improvements were adopted, but every effort was made to reach a greater state of perfection in providing the facilities for transportation, for the housing of men and storage of equipment, all most necessary parts of an efficient fire-protection organization. I shall give hereunder a summary of the work carried out on the different classes of improvement projects.

Roads and Trails.—A total of approximately 460 miles of roads and trails was constructed in the district. With the exception of a very few miles of trail, this work was confined to the various divisions of the Rocky Mountains forest reserve. This may be classified into 38 miles of road, 95 miles of primary trail, and 332 miles of secondary trail. Specifications covering these different classes of trails have been provided in previous reports, so that it is unnecessary to touch upon them here. The average cost per mile of road varied from $30 to $130 per mile, exclusive of ranger labour. This wide variation in cost is due to the fact that one road which was constructed lay in the Saskatchewan valley, where there are few obstructions to roadmaking. It will be noted that in the last annual report it was indicated that the cost of road construction in this valley is by no means a true indication as to the average cost of roads, and the same statement applies to that part of the road constructed during the past season. Another road project was in the Red Deer valley, where, owing to the more constricted nature of the valley, many obstructions were met with, necessitating expensive side-hill grading and cuts. On this road the average cost per mile attained the maximum. Under present conditions the construction of roads is carried out only to a limited extent, in places where such construction is not unduly difficult or costly and is necessary to provide a quick means of transportation for large amounts of supplies and equipment.

The 95 miles of primary trail construction was confined to the Athabaska and Brazeau forests, the amount being approximately evenly divided between these two forests. It has been pointed out in previous reports that the average cost of primary trail for work throughout the Rocky mountains should be in the neighbourhood of $50 per mile. The work carried out during the past season, however, on the Athabaska and Brazeau forests averaged approximately $115 per mile, exclusive of ranger

services. In both of these forests the trails which were constructed are to be the trunk trails of the reserve and, therefore, a very high standard of construction was maintained. Another reason for the very high cost of these trails was that, whereas most primary trails which have been constructed at a much lower cost followed, as a general rule, a previously constructed Indian trail, these trails in many cases struck right across country and, in order to secure a more direct route, but little attention was paid to previously existing trails. It may also be stated that some trails which had previously been constructed for $50 per mile and classed as primary were not actually complete in every detail. The primary trails constructed this year, however, have been brought up to the standard specifications in practically every respect and in some cases, I believe, that the specifications are exceeded. I am not altogether certain that with the annual appropriations for improvement work that we are justified in constructing any great amount of expensive trail of this nature. In order to secure an adequate comparison, however, between trails which are brought entirely up to specifications during the initial season of construction and those which only partly come up to specifications, we are allowing the construction of a few trails of this very high character during the coming season. The probability is that this policy is absolutely the correct one for the Athabaska forest, where it is necessary to make the more northern parts accessible from the headquarters and railway. Up till the present time the trail system on this forest has been very poor indeed, the few existing Indian trails having been but poorly maintained, owing to the small amount of travel which takes place in any one year.

The 332 miles of secondary trails were divided between the Clearwater, Bow River, and Crowsnest forests, with approximately 5 miles on the Lesser Slave reserve. The average cost of trails of this character was approximately $25 per mile, exclusive of ranger labour. The greater portion of this secondary trail was constructed on the Clearwater forest, where some 256 miles of secondary trail were constructed. Owing to the large amount of trail construction which was completed at comparatively low cost on this reserve, I rather doubt that the trails can be stated to entirely come up to secondary specifications. There will, therefore, be a certain amount of further work necessary on these trails, which in all probability can be completed by ranger labour. With the completion of the last season's work, the Clearwater forest is probably more adequately provided with trails than any other reserve with the exception of the Cypress Hills forest reserve. This is the result of a pretty consistent improvement programme carried forward from year to year, so that, whereas the Clearwater forest was, in 1912, perhaps the most poorly equipped forest in this respect, it is now one of the best.

Other trail work which cannot consistently be classed with the above was carried out on the Cypress Hills forest reserve. This work was in connection with the Elkwater Lake summer resort, where a total of about $600 was expended in cutting out and grading numerous streets and lanes in the summer resort subdivision. The work on this resort is not completed as yet, but sufficient construction was carried out last year to make accessible all lots which had been applied for. It is proposed to carry on, from year to year, sufficient work to provide for the needs of the residents. In other respects the Cypress Hills reserve is provided with an adequate trail system, due to the extensive travel which passes through it. The only trail construction which is necessary, therefore, consists of improvements to existing trails, which can for the most part be carried out by ranger labour.

The above represents new trail construction which was carried on during the improvement season. In addition to this, however, a considerable amount of ranger labour was expended throughout the district in the maintenance of old trails, the opening up of auxiliary trails, and the location of proposed new trails. In general, it may be stated that the standardization of trail construction has had a most

desirable effect, and although there are still many respects in which more efficiency is desired, the lines along which this should be developed have been definitely and well laid down. One result of the better organization which prevailed is that, notwithstanding the disastrous nature of the fire season which occurred while improvement work was in full swing, the gangs were switched to fire-fighting and then back to trail work without any very great difficulty or loss of time. It will be noted that only a small amount of trail is indicated for the Lesser Slave reserve. This is due to the fact that it was impossible to provide sufficient funds for any elaborate trail construction on this reserve. Also, as the supervisor assumed office in the spring only, it was considered advisable that before any definite programme of trail construction was started, he should be given an opportunity to become familiar with the reserve, and thus preclude the possibility of bad mistakes, which are the customary result of unplanned and indefinitely located trail work.

Buildings.—Building plans prepared during the previous year were proceeded with throughout the fiscal year. Altogether some thirty-one buildings were erected or completed. On the Athabaska forest the headquarters house which had been commenced during the latter part of the previous fiscal year was carried to completion. On this forest, therefore, we have a commodious headquarters building for the use of the forest supervisor and officers of the forest. On the Brazeau forest a class A building was purchased from the Mountain Park Coal Company, and is located in the town of Mountain Park, where the present headquarters of the Brazeau forest are situated. On the Bow River forest the Red Deer ranger station which was fairly well under way at the end of the previous fiscal year was carried forward and for the most part completed. This station is the headquarters for the ranger of the Red Deer district of the Bow River forest and a most important administrative point in the north half of the Bow forest. A class A building was also erected in the Elbow district to serve as headquarters for the ranger in that part of the Bow forest. This building was started in the later months of the year, and at the end of the year was nearly completed. The cost figures in connection with these projects show a considerable variation due to several causes. In the first place, the season of the year in which a building is constructed exercises a decided effect on the length of the period of construction, while in the second place the cost of some buildings is much higher than others owing to the fact that they are far removed from railway facilities, and hence lumber and other building materials have to be freighted for a considerable distance. On the Cypress Hills forest reserve the Spring Creek ranger station was started and at the end of the year was about three-quarters completed. One class B building was erected on Birch creek in the Cypress Hills reserve and serves as a ranger station for that district. It was impossible to secure building logs for this station owing to the scarcity of large timber. It was necessary, therefore, to freight lumber and other supplies from a considerable distance. The cost of this building, complete, including ranger labour, was approximately $530.

Altogether, sixteen class C cabins were constructed, nearly all of which were brought to a state of completion. Two or three of these projects had been started during the previous year, but in such cases by far the greater proportion of the construction was carried on this year. These cabins show rather a wide variation both with regard to cost and to the method of construction. The average cost of each runs from $200 to $250, including ranger labour. It may be stated, however, that some of these cabins are in reality superior to a class C cabin, although they are not large enough to come up to class B standards. It is on the Athabaska and Brazeau forests that these better cabins have been constructed, and the final appearance and convenience of the structures fully justify the small extra expenditure which has been made, for not only are they more commodious for the purpose of housing the rangers, but they also

provide better accommodation for the storage of equipment and supplies. Four of these cabins were erected on the Athabaska forest where, previously, practically no cabin accommodation was to be found; two on the Brazeau forest; five on the Clearwater forest; one on the Bow River forest, and four on the Crowsnest forest. The idea of constructing these cabins is, of course, to provide shelter for the forest officers travelling about the reserve, and it is hoped that before long there will be an extensive chain of cabins and caches for each reserve, which will make it unnecessary for rangers and other officers to depend on the transportation of tents for shelter purposes. Although a great deal of work has still to be done before this result can be obtained, it will be seen that with consistent building from year to year throughout the reserves, it should not be very long before ample provision is made for this purpose.

Five barns were erected during the year, one each on the Athabaska, Clearwater, Bow River, Crowsnest, and Cypress Hills forests. These barns are very commodious structures, and in most cases are constructed of logs. The cost varies from $200 to $375, including ranger labour; the variation in cost being due to the varying sizes of the buildings and the distance material had to be hauled. In addition to the foregoing improvements there were erected two storehouses, two small stables, four corrals and several small bridges. Substantial fences were erected at eight headquarters and ranger stations to provide pasture and privacy. Still further construction was carried on in providing water at various ranger stations. At the Coleman ranger station on the Crowsnest forest considerable expenditure was made in piping water from some distance and taking it into the kitchen of the house. In other cases water was piped from springs to bring it closer to the ranger stations, although not actually carried into the buildings. At still other stations, wells were constructed or improved.

A limited expenditure was also made in the maintenance of projects which had been constructed during previous years. In a great many cases these projects had never been properly completed, so that it was necessary to spend a certain amount of time and money in bringing them up to standard. In other cases the expenditure was merely to cover ordinary maintenance, which it is necessary to provide if the stations and cabins are to be kept in proper repair. It will be noted in the remarks on buildings that there is no reference made to work done on the Lesser Slave forest reserve. As has been previously pointed out in connection with trails, it was not possible to provide for any extensive improvement operations as the funds were limited; and also, the supervisor had not had an opportunity to become sufficiently familiar with the reserve to definitely lay out proper plans for cabin construction. It may be stated, however, that on this reserve several old hunting cabins were found and put into a state of repair, and these will be used as ranger stations until such a time as sufficient funds can be provided for the erection of standard buildings. In connection with this reserve a small office building was purchased in the village of Sawridge. Materials were also purchased for the construction of one cache.

Telephones.—Very little telephone construction was carried out during the past season, owing to the limited funds which were available for improvement work, and to the fact that it was considered advisable to devote practically all of these funds in the construction and maintenance of trails and buildings. There seems to be no legitimate reason, however, why a comprehensive plan of telephone communication should not be prepared for each reserve. This class of construction is, of course, fairly expensive; nevertheless, the great saving which would be made in communication, which is at the present time very difficult, would fully warrant the expenditure of a considerable amount of money for this work. Up till the present time only three lines have been constructed, each from 20 to 30 miles in length, but in only one case has the actual telephone communication been established. This was on the Brazeau forest, where a line from Coalspur to the Pembina Forks has been in operation for

nearly two seasons. On the Crowsnest forest two lines branching from Coleman northward and southward had not been quite completed, and no communication had ever been held. During the past season, however, the line from Coleman to the Gap ranger station was put into commission, and for the first time on that reserve telephone communication was effected between two important ranger stations. During the coming season a special effort will be made to put the line running south from Coleman into proper condition so that we will have communication in that direction also.

FIRE PROTECTION.

The fire season of 1914 was the most disastrous which has occurred since the organization of this office. Since 1910, when large areas in the Rocky mountains were devastated by fire, there had not been a really dangerous year. During the seasons of 1912 and 1913 there was abundant precipitation, and consequently little fire danger, with the result that the fire protective organization was by no means put to any severe test. The season of 1914, however, brought with it several periods of very great danger so that, as a result of experiences in that season we should be in a position to judge, to a certain extent at least, the efficiency of the fire-fighting organization which has been developed. Previous reports show that a great deal of energy, time and money have been directed toward the establishment of proper transportation facilities which should have a direct effect in solving some of the most difficult problems of fire-fighting. It would appear, however, that in the rush and effort to provide adequate improvements for transportation the main objective of such work, namely, fire protection, has perhaps not been so constantly before our minds as it ought to have been. In other words the fire protection plans have not occupied the important position in relation to general work that is desirable. There is no doubt whatever that this was the result of two extremely favourable seasons in 1912 and 1913. It must not be inferred from this statement that fire protection has been greatly neglected, for such is not the case. Our experiences of the past season, however, have brought out many important points and have taught many lessons both with regard to prevention of fires and active fire fighting. It can justly be claimed, as is pointed out in my report on improvements, that with the organization which has been effected, it has not been such a difficult matter to transfer the forces from improvement work to fire fighting. The main point of my argument is, however, that no matter what the immediate conditions may be, from April to November we must constantly keep before us the distinct vision of the ever-lurking enemy, fire.

Weather conditions throughout the district varied greatly, with consequent variations in fire danger. In the Rocky mountains, if we could imagine the relative fire danger plotted as a curve, there would appear on such curve three peaks of fire danger; one fairly dangerous period in April; a very dangerous period toward the end of July and the first of August; aud finally a danger period in October. On the Lesser Slave reserve the periods of great danger were confined to April and October, while on the Cypress Hills reserve the greatest danger occurred during July and August. Further comparison shows that, although the fire records are very dissimilar, the conditions on the Athabaska and Brazeau forests were almost identical. Also, there was great similarity in fire conditions on the Clearwater and Bow River forests. The Crowsnest forest differed greatly, as regards danger periods, from other divisions of the Rocky mountains, the fire danger extending from June till August, with practically no danger in April, September or October.

As compared with the previous season there were approximately five times the number of fires. Undoubtedly, however, a considerable number of the 104 fires which are reported should not have been reported as occurring on the reserves. In some cases where fire occurs on a railway adjacent to a reserve, and the fire fighting is undertaken by the forest officers, the figures in connection with the fire find their

way into the supervisor's reports. If fire is fought by forest officers there is a certain justification for having the same recorded in the monthly reports, although the supervisor should be called upon to make a distinction between fires occurring on the reserve and those which occur adjacent to it. Below is a brief table showing the various agents in the cause of fires, in order of their relative importance, with the percentage attributed to each indicated.

	Per cent.
Locomotives	75
Unknown	12.5
Campers	5.78
Clearing	2.89
Lightning	1.93
Saw-mills	.95
Dropping matches	.95
Total	100

It is noted that in the last annual report the percentage of fires attributed to railway locomotives and construction was approximately 57 per cent. The above figures indicate, therefore, an increase of 18 per cent in fires caused by railway operations. It should be stated, however, that this should not be taken as indicating that the efficiency of railway protection has decreased, for the great majority of these railway fires occurred on the Edmonton, Dunvegan and British Columbia railway where, in contradistinction to other railways, the fire protective organization on the part of the company was notoriously ineffective, and indeed, almost absent. It is also undoubtedly true that there is a tendency on the part of some men to charge any fire which occurs in the vicinity of a railway line to the railway operating in that district. I am still further of the opinion that some small fires have occurred on the reserves at points remote from railway lines which have not actually been reported as they should have been. Every fire which has done damage has been reported, but there seems to be a little carelessness exhibited in not having some of the very small fires reported. I think, therefore, that if the statistics of every fire which had occurred were available it would be possible to decrease, to a certain extent anyway, the percentage attributed to railways.

There still appears to be considerable difficulty in determining the causes of a great many of the fires. This will be more clearly indicated by the inclusion of a percentage table which eliminates the railway fires. It is found in this manner that the number of fires occurring throughout the reserves and remote from the railways is as follows:—

	Per cent.
Unknown	50
Campers	23.5
Clearing	11.5
Lightning	7
Matches	4
Saw-mills	4
Total	100

This table shows quite conclusively that we are not getting sufficient information with regard to causes of fires. It is, of course, difficult in a great many cases to ascertain the actual cause. Nevertheless, I am strongly of the opinion that not sufficient efforts have been directed to the determination of causes on a reasonable basis. If the same energy were directed to ascertaining the cause of a fire on the reserve as is directed to attributing a fire to a railway, I think that there would be considerable decrease in fires which are classed as "unknown." Of the known causes, it appears that campers are the primary agent in the cause of fires, with clearing, lightning, matches, and saw-mills coming in order as indicated in the table above. Aside from the railway fires it appears that altogether twenty-six fires have been reported on the

reserves. Of these twenty-six fires nearly half proved to be serious. This would indicate, therefore, that we still have a long way to go before we may claim to have reached a state of efficiency in fire fighting. In stating, however, that of the twenty-six fires which occurred nearly half proved to be serious, an assumption is made that all the fires have been reported. As previously intimated, I am rather of the opinion that there have been numerous small fires in the various reserves which have not been dealt with in reports. This fact, however, does not alter the general case that it is necessary that more careful attention should be given to details of organization for fire protection.

Among the fires which occurred throughout the district there were six extremely large ones, each of which cost into the thousands of dollars to fight and bring under control. It should be stated, however, that none of these fires was actually brought under control by the efforts of the fire-fighting organization, but rather that the occurrence of opportune rains after each fire had burned for some days was the final agent in extinguishing the fire. It can quite justly be claimed however, that in each case the efforts put forward by the forest officers were fully justified, for, although it was not entirely due to their efforts that the fires were finally extinguished, it is undoubtedly true that their efforts confined the fires to much more limited areas than would otherwise have been the case. On the basis of information which has been obtained in connection with these fires it is difficult to draw any definite conclusions as to the part played in each case by the presence of slash or débris. The general statement may be made, however, that in the fires known as the Tunnel, Ghost, and Yellowhead fires, slash was undoubtedly a factor in the rapid spread of the fires. In the case of the James River, Pacific Pass, and Mountain Park fires it appears that no logging operations had previously been carried out on the areas burned over. In the case of these latter fires, however, there were large amounts of débris on the areas which had accumulated as a result of fires in former years. It has many times been pointed out that owing to these former fires a great proportion of the Rocky Mountains reserve is covered with fallen dead timber. For the most part there is dense reproduction of young jack pine and spruce which has grown up between, and in many cases supported by, this dead timber, so that when fire actually does get started, there is not only the very inflammable foliage of the young reproduction to spread the fire, but also a large amount of exceedingly dry timber, lying on the ground, which serves to feed the fire and keep it going until practically every vestige of vegetation is destroyed and the ground is burned to the mineral soil. Whenever a fire starts in or near this reproduction it is almost a certainty, if there is any wind at all, that it will get into the crowns of the trees and sweep over a large extent of country with exceeding rapidity, making it very difficult indeed to take any very effective measures for control. Speaking of fires in general, it may be stated that in the majority of cases fires do not get into the crowns of the trees. In the case of practically every fire of large size which occurred during the past season, however, the fire entered the crowns of the trees, and it is due to this fact that the very large extent of country was burned over. Fighting fire in timber of this class is, perhaps, one of the most difficult propositions with which a man can have to contend. Time and again fire-guards, which under ordinary circumstances would have proved adequate to meet the situation, were constructed, and for a short period of time it appeared that they would prove effective. Unfortunately, however, gales arose, carrying the flames to the tree tops, with the result that the fire spread beyond such guards as had been established, and practically annulled all measures which had been taken for extinguishing the fire. The construction of such guards, however, though serving only as a temporary check to the progress of the fires, undoubtedly served as partial control until the occurrence of rains which finally extinguished the fires.

Owing to the extensive nature of some of the fires it is difficult to give anything more than an approximation of the total area burned over or the actual damage

done. Our information, however, would indicate that approximately 2 per cent of the area under reserve was swept by fire. The most serious situation occurred on the Brazeau forest, where there were four exceedingly large fires, and several others of considerable size. On the Bow River forest there were two very large fires which spread over a considerable extent of country and cost very large amounts of money to fight; and on this reserve the largest area was burned over and the greatest amount of damage done of all the reserves in the district. The Clearwater forest also suffered from fire but to nothing like the same extent as the Brazeau and Bow River forests. The fires on the Crowsnest forest were kept pretty well under control. On the Athabaska forest we were exceedingly fortunate, for although conditions were practically the same there as on the Brazeau forest, no serious fires occurred. On the Cypress Hills reserve one large fire occurred, but no very extensive damage was done. On the Lesser Slave reserve numerous fires originating on the line of the Edmonton, Dunvegan and British Columbia railway spread to the reserve and extensive areas of that reserve were burned over. Figuring at a stumpage rate of $1.50 per M for merchantable timber, and at the rate of $5 per acre for young growth, $800,000 is a conservative estimate of the value of timber destroyed on the reserves of this district. It is also very conservative to state that $80,000 was the amount expended from the funds of the district for fire protection and fire fighting. It will be noted that this latter figure represents 10 per cent of the conservatively-estimated damage. It has previously been stated that approximately 2 per cent of the reserve area was burned over, and (although it is a mere assumption for the sake of comparison) if we could assume that the damage of the past season represents 2 per cent of the damage which would result in case of fire burning over all the reserves, it will be seen that the total of such damage would be $40,000,000, so that there was expended about one-fifth of 1 per cent of the value of the stand in the protection of one of the most important natural resources and national assets. It must be realized that the above figures are mere approximations, but, if anything, they err in being too conservative. To consider the above figures as accurate would in the first place assume the capital value of the timber resources of the reserves at about $40,000,000, which valuation would be quite evidently ridiculously low, and is certainly not intended in the above comparison. In the second place, in setting a value on timber destroyed or damaged, a stumpage price of $1.50 represents only that portion of the absolute value of the timber which would at present rates accrue to the Government. It is obvious that the presence and disposal of merchantable timber means not only revenue to the administration, but also employment for thousands of people. In the absolute values must also be considered profits to the manufacturer, wholesaler and retailer; and, most important of all, lumber at lower prices to the consumer. It is almost unnecessary to point out that in the large development which is taking place in coal mining, we have promise of markets for a class of timber which, with conditions existing in the Rocky mountains, we are in the best position to produce. The importance of fire protection in its direct relation to waterflow in the western provinces has many times been pointed out, and in fact, was one of the main considerations in the establishment of the reserve. For the above reasons there would appear to be ample justification for greater expenditures for fire protection.

The expenditure for fire fighting on all reserves in the district was $18,579.30, which covered the temporary help employed, supplies purchased and the costs of transportation of men and supplies. It will be seen that this expenditure is approximately one forty-third of the value of timber destroyed. If it can be assumed that the damage which would have resulted, had some of these fires been allowed to spread farther than they did, would be equal to the damage on areas actually burned, the saving which was made justified the expenditure. This would indeed be a modest claim, for there is no doubt whatever that in some cases very large areas were saved by these operations. A great factor in the cost of fire fighting was the distance it

was, in many cases, necessary to transport men and supplies. In some cases, particularly on the Brazeau forest where there were three mining towns from which men could be drawn, men were fairly close at hand. In other cases, as for instance, in the Ghost and James River fires, it was actually necessary to hire men in the city of Calgary, transport them by rail to Morley and Olds, and then team in both men and supplies anywhere from 25 to 75 miles. It is unnecessary to state that fire fighting in this manner is expensive. It is doubtful, except in such forests where mining towns are located, if we will, for some years to come, be able to depend on securing sufficient labour to handle these large fires without going for a considerable distance to do so. Also, the population of the mining towns is esentially foreign, and the experience of last year would indicate that it is a difficult matter to secure willing co-operation from men of this class, for in the majority of cases they are but temporary residents and not very directly interested in the preservation of timber in the particular locality. It is also worthy of note that the four very large fires on the Brazeau forest occurred in the immediate vicinity of these towns, although we have definite evidence that one started from a railway, one from lightning, and the causes of the other two rather difficult to determine. On the Brazeau forest there were three very large fires, one at each of the three mining towns, and two other fires all burning at the same time so that the energy of the forest staff was taxed to the utmost, and although the Brazeau fire record was the worst of all the reserves of the district, Supervisor Clark and his men deserve great credit for the energy and effort put forth under the worst conditions imaginable.

SILVICULTURE.

No great change has been effected in the work along silvicultural lines, although an endeavour has been made to secure more faithful compliance with the conditions of timber sales and timber permits which have bearing on silviculture. The financial stringency which started in the previous year, and became very acute on the outbreak of the war, limited to a great extent the increase in timber sales. During the year, four new timber sales were effected, one each on the Brazeau, Clearwater, Crowsnest, and Cypress Hills forests. A fifth sale was initiated on the Brazeau forest, and some preliminary work in this connection was carried out by the forest officers, the financial stringency, however, prevented the consummation of the sale. It may be noted that three of these, namely, all the sales effected on the Rocky Mountains reserve were made to coal companies or to operators in mining timbers. My predecessor has several times pointed out that these mining operations are providing and will continue to provide, probably for a great many years, the best market for what merchantable timber we have. It is highly desirable, therefore, that the requirements of such operations should receive due consideration in the formulation of silvicultural and management plans for at least certain portions of the Rocky Mountains forest reserve, where coal occurs in commercial quantities. It is unfortunate that during the past season three large fires occurred in the vicinity of the three mining towns of the Brazeau forest, and large amounts of timber which it had been contemplated to reserve for sale to mining operations were destroyed. It is hoped, however, that in some places we shall be able to make arrangements to salvage this timber before deterioration sets in. To do this, however, it will, probably, be necessary to secure the co-operation of the mining companies, in consideration for which we might be justified in making arrangements for long term payments for timber taken out. In a special report on one of these cases I pointed out that, although these companies are more or less directly dependent on timber within reasonable distance of their mining operations, they cannot be expected under present financial conditions to be in a position to pay large amounts of money in advance for the purpose of securing this timber and taking it out within a period of two years. In one case it is believed that there is sufficient dead timber within reason-

able distance of the operation to supply the timber necessary for mining for a period of possibly six or eight years. If this timber be taken out within two years it is quite probable that the loss will be kept to a minimum. In connection with the other two mining operations in the Brazeau forest no arrangements have as yet been undertaken for the purpose of disposing of burnt timber. In one case this will probably be impossible as the mining company is involved in litigation and is at the present time not operating. In the second case the mining company owns considerable timber in the vicinity, and for a few years at least will not be so dependent upon securing timber from the Government. On the Crowsnest forest a sale of about 350,000 lineal feet of dead timber was effected. This timber was burned over during the severe fires which occurred in the Crowsnest country in 1910. If it were possible to carry on more sales of this character, considerable revenue would accrue to the department from dead material which, within a few years, will reach a serious state of decay. Considering the locations of the various mine operations throughout the reserve, however, about the only place where it will be possible to carry on sales of this nature will be in the Crowsnest pass. It is quite evident from the nature of this particular sale that the probable scarcity of timber for mining operations in the Crowsnest pass is beginning to be felt. Present financial conditions, if they continue for any length of time, will, however, decrease the demand for mining timber.

It was hoped that in connection with the timber sales on the Clearwater forest it would be possible to make a considerable study both in regard to brush disposal and also with regard to the systematic marking of timber. Owing to numerous changes in personnel, however, our anticipations in this respect were rather seriously upset. During the summer a systematic effort was made to secure a proper recognition of the brush-disposal conditions on timber sale 16, and it may be stated that this resulted in very satisfactory brush disposal being conducted by the operators. Timber sale 34 was consummated at the time of a serious change in personnel, with the result that the operations were fairly well under way before it was possible to give any considerable attention to it. Until recently the supervisor of that reserve has been without the services of a forest assistant, so that it is only recently that this timber sale has received the attention which it required, and it is reported that the brush disposal has been carried on satisfactorily. Also in connection with other timber sales it would appear that the brush disposal had been carried on to the satisfaction of forest officers. Very few operations have been carried on on license timber berths situate in the forest reserves, but wherever operations have been conducted, the same old conditions with regard to carelessness in the disposal of slash were found. Our experience with various mine timber operators would lead us to believe that they can successfully and profitably conduct operations, even when burdened with the cost of brush disposal When, however, these operators who, as compared with the larger lumber companies, can be classed as small operators, are burdened with the cost of brush disposal and close utilization, and within a short distance there may be a large lumber operation in progress, where nothing but carelessness is exhibited in connection with the disposal of slash, it is quite evident that there is a certain amount of justifiable dissatisfaction on the part of persons carrying out operations under our regulations. Any person who has occasion to study conditions at all must frankly admit that the system of brush disposal is very necessary to the protection of timber. There is no reason, however, why all persons conducting such operations should not be burdened with the same responsibilities as those operators who may come within our Forest Reserve Regulations.

The timber permit business is almost wholly confined to three reserves of the whole district. On the Lesser Slave reserve and on the Athabaska, Brazeau, and Clearwater forests very few timber permits have been issued, owing to the fact that adjacent to the forest reserve there is, in most cases, a fairly well timbered area which at the present time is the source of supply for the requirements of the settlers in the vicinity. On the Bow River forest also the timber permit business is more or

less confined to the southern portion. On the northern three-quarters of this forest the foot-hill country adjacent to the forest reserve has until the present time, for the most part, supplied the requirements of the people. Approaching the south half of the Bow River forest, however, and pretty well all through the Crowsnest forest, the forest reserve boundary comes pretty close down to the prairie country, the result being that the forest reserve is to a large extent the source of supply for building timbers and sawlogs to supply the small mills which exist. In some districts of the Crowsnest forest there is a fairly large permit issuance. It is in the Cypress Hills reserve, however, that the maximum issuance of timber permits is reached. Situated as it is, this reserve furnishes the one local source of supply of cordwood, fence posts and rails and other small timber for the surrounding country to a distance of 40 or 50 miles. On this reserve, therefore, the timber permit business is exceedingly heavy and a great proportion of the time of the supervisor and forest rangers is devoted to conducting this business. Until quite recently the permits on this reserve were almost entirely confined to dead timber which resulted from extensive fires which swept the reserve in the years 1880-9. This dry timber is, however, fast becoming exhausted, and it is necessary that considerable attention should be given to the formulation of definite management plans for conducting the timber business of this reserve. One small timber sale is under way but confines itself to some over-mature and defective timber and just a few sections in the western part of the reserve.

During the past year it has not been possible to carry on any further work in connection with the construction of volume tables. Mr. McVickar, who was previously assigned to this work, resigned from the service early in the spring, and as no other man was available to carry on this work it has to be temporarily suspended. It is highly desirable, however, that as soon as suitable arrangements can be made further data should be gathered for the construction of more extensive volume tables.

GRAZING.

The intensive administration of grazing was confined almost entirely to the Crowsnest and Bow River forests. There was also a small amount of permit grazing carried on on the Clearwater and Athabaska forests; not nearly to the same extent, however, as on the former forests. On the Brazeau forest and Lesser Slave reserve there has been no organized grazing whatever, this being due to the fact that practically no applications had been received, there not being any great demand for grazing up till the present time on either of these reserves. On the Cypress Hills reserve the exact form which the grazing administration will take has not yet been definitely decided. So many factors enter into the grazing proposition on this reserve that it has been considered better not to take any definite steps in administration until the whole thing has been properly considered; for otherwise, steps might be taken which would prove ineffectual and it is considered inadvisable to put into operation a system of control which might have to be altered. This reserve is surrounded by a well-settled ranching country, many of these ranchers in a dry season being entirely dependent upon the Cypress Hills reserve for securing hay with which to winter their stock. To handle the reserve therefore, on a strictly grazing basis would in a great many cases work hardship upon small ranchers.

The amount of forage on the range depends primarily on the amount of rainfall which may occur in a season, particularly during the first half of the season. In general it may be stated that if abundant precipitation is experienced in the fore part of the season, with sufficient moisture to prevent drought during the closing part of the season, the maximum amount of forage should be available. It must also be stated, however, that in some localities a dry season provides additional grazing on areas which in an ordinary year are altogether too wet and soft for the safe grazing of stock. On the two reserves under intensive grazing administration there was, during the first part of the season, sufficient rainfall to provide a fairly luxuriant

growth of forage plants. This may be qualified by stating that on some parts of the Bow River forest the rainfall was slight during the first part of the summer. By midsummer, however, the range became so dry that great damage resulted to the forage. To a great extent the range on these reserves had been extensively used prior to the inauguration of the grazing administration. In some places there had been a certain amount of overstocking, while in others there had been but little use of the range. The introduction of the grazing organization was designed, among other reasons, for the purpose of adjusting this difficulty; and in this respect it has been fairly satisfactory through the first season of operation. Several of the grazing districts, it may be stated, were almost entirely unused previous to this year, but from now on it may be expected that they will be almost if not quite fully stocked. During the coming season it is probable that we shall find practically all the available range of the Crowsnest forest fully utilized. In the Bow River forest it is expected that most of the available range south of the Bow river will be applied for and grazed under permit. North of the Bow river, however, only part of the range will be used. There is considerable good range in the north half of the Bow River forest but, owing to the fact that it is not so accessible as the country further south, it does not offer the same attraction to ranchers as is found elsewhere. An instance of this is the valley of the James river where there is considerable good grazing.

Although there were in certain localities local evidences of overgrazing, the condition of the range as a whole was at the end of the season quite satisfactory. For the most part also, stock which was grazed on the forest reserves came off the range in the fall in an entirely satisfactory state, the only exceptions to this being in such places where, as above stated, there were evidences of overgrazing and the forage was as a result not quite so good. It has been previously stated that the drought which occurred in the latter part of the season greatly reduced the available forage. The fact, however, that in most cases the stock came off the range in good condition is an evidence that in the average season it may be possible for us to increase our grazing allowances in the various districts.

The total number of stock grazed on the Crowsnest forest was 20,086 head, consisting of 7,092 head of cattle, 994 head of horses, and 12,000 head of sheep. These figures, of course, represent the stock grazed under permit. The permits were 95 in number, most of which were taken out by class 1 applicants, as defined by the grazing regulations. On the Bow River forest a total of 2,317 head of stock was handled, consisting of 222 horses and 2,095 cattle. No sheep were grazed on this reserve. These permits were divided amongst twenty stock owners adjacent to, or in the vicinity of the reserve. On the Clearwater forest where the grazing was not organized, permits were issued for about 102 head of horses and cattle. Also on the Athabaska forest a small number of permits were issued to forest users in the vicinity of that reserve, consisting essentially of half-breeds who have been located in that country for some time.

It was to be expected that in the first year of operations many difficulties would arise, owing to the impossibility of satisfying the desires of all applicants. This naturally led to the occurrence of trespass in several cases, particularly in those localities where the range had previously been fully stocked. Before the season opened, therefore, it was realized that there would necessarily be a period of adjustment for such difficulties, and with this in view the supervisors were instructed not to carry trespass regulations to the extreme. The total amount of trespassing stock on reserves where there was any pretence of grazing administration is estimated at 1,000 head. A considerable proportion of this, however, was found on reserves where the grazing organization had not been gone into with any great detail. Forest users should by now be thoroughly familiar with the grazing requirements and it is expected that trespass cases will in future meet with censure as provided by the regulations, and that this will reduce trespass to a minimum.

Previous to the opening of the grazing season each reserve, where organized grazing was contemplated, was subdivided into grazing districts. These districts comprised definite portions of the forest that naturally constituted units for grazing management. For the most part each grazing district was accessible to a certain community of applicants, and where stock associations had been organized, their recommendations were considered to apply only to the district which directly affected them, and in which they were directly interested. Most of the grazing districts were still further subdivided into divisions, more or less separate, but still forming part of a general district to which uniform regulations with regard to grazing periods and grazing units should apply. In the issuance of permits the individual applicant was given the right to range his stock on a stated division of a stated grazing district. In most cases the area was the same as that which the stock owner had previously utilized and to which his stock was accustomed. New applicants who had not previously used the forest range were assigned to districts and divisions not fully stocked, but as accessible and suitable as possible to the stock owner, due consideration being given to the class in which the applicant was placed as provided by the regulations. While at a future date it may be found necessary to readjust the districts and divisions, those which were made last year were found to be satisfactory. The districts and divisions will, therefore, be essentially the same for the coming season. On all the grazing districts for the Crowsnest and Bow forests the grazing capacity of areas which were under permit last year is estimated at between 15,000 and 20,000 head of stock (horses and cattle). It is hardly possible from information at hand to give an accurate statement as to the ultimate grazing capacity for these two forest reserves, for there are at the present time grazing areas which are almost wholly inaccessible. On the other hand, it may be stated that the figures above, while they do not include all areas the title to which is vested in the Crown, do include some areas covered by timber licence on which we have not as yet secured an unhampered field for grazing administration. This matter of grazing on timber berths has been the substance of several letters addressed to the head office; and it is unnecessary, therefore, to refer to the matter further than to state that the present difficulties with regard to timber berths are such as should be removed as soon as possible. It may also be stated that the total available range which will be used during the coming season will be considerably reduced, owing to the large reduction in area of the Crowsnest reserve which was occasioned by the extension of the Waterton Lakes park. This extension cut off range which would provide for about 3,500 or 4,000 head of stock.

The grazing periods in different parts of the district vary greatly according to the nature of the forage the climatic conditions affecting grazing, and the requirements of the stock owners. On the basis of periods there are perhaps three classes of permits; summer grazing, winter grazing, and all-year permits. The first class is issued for areas where the grazing is essentially on the level, the second where side-hill grazing predominates, and the third where both classes are available. In establishing periods it is, of course, necessary to give consideration to the vegetation of the range. In other words in making provision for a summer grazing period it is necessary to keep stock off the range until such a time as the vegetation is well started. For a similar reason, where winter grazing periods are established, it is desirable that the stock should be removed from the range early in the spring before vegetation sets in. In places where the range is not fully stocked and sufficient level and side-hill grazing areas are available it is possible, and sometimes necessary to issue year-long permits. Another feature which to a certain extent enters into the establishment of grazing periods is the presence of poisonous plants. For example in certain localities of the Crowsnest forest it is found that a large number of cattle are lost through the "bloat disease" said to be caused by the presence of a

luxuriant growth of vetches. Many cattle are supposed to have been lost in this manner last year, so that there is strong objection on the part of cattle owners to turning their cattle on to the forest range until about the first of July. On the other hand, horses do not seem to be affected by these vetches, so that the period for this class of stock may start earlier in the season, about the first of May. The grazing unit is also a variable quantity. This unit, which has a determinative function in the classing of applicants, is fairly well defined by the grazing regulations, and it may be seen that the absolute grazing unit for a district would depend on the qualities of the range adjacent to the forest reserve and used by the permittees for stock purposes. The unit in actual practice however, does not as yet coincide with the absolute or ultimate grazing unit. With a little explanation the reason for this will be obvious. It is desirable to place a reasonable number of permittees in class 1 in order that the stock owners may feel that there is stability in the administration. Where, therefore, there is more than sufficient range to provide for all applicants for a particular district, or even where there is just sufficient range to provide for them without there being any overcrowding, it is possible to set the grazing unit rather arbitrarily. As, however, range becomes more fully utilized and we are confronted with the problem of effecting a reduction, it will be more and more necessary that the grazing unit in practice should be the absolute unit fixed by the condition of the country adjacent to the forest range. The grazing units in forests during the past season ranged from 80 to 150 head.

It has previously been pointed out that the best way to effect a proper organization for grazing administration is to secure, so far as possible, the co-operation of the stock owners who make use of the forest range. It is well known that there is a great diversity of opinion among individuals engaged in the various branches of the stock industry with regard to some of the important factors affecting grazing. Not only do these differences of opinion exist with regard to the actual grazing but also with regard to regulations promulgated for its control. In recognition of these points efforts have been made in dealing with grazing matters to co-operate so far as possible with stock associations which previously existed or which had been especially organized for the purpose of securing recognition under the regulations. As a result of this it has been found that general opinions with regard to the administration have become much more uniform and that there is a better appreciation and observance by the individual user of the principles embraced in the regulations. Furthermore, it has been found that in the main the regulations are admirably adapted to the purposes for which they were adopted and before very long there should be a thoroughly organized system of permit grazing throughout the reserves. The system is a new one, practically an innovation in this country, and as such was liable to considerable criticism and objection. Such criticism and objections, however, have for the most part been fairly met and the advantages of this form of grazing administration are now beginning to receive due appreciation.

In developing further in grazing administration it is necessary that considerable time and effort should be given to a study of all the fundamental factors affecting use of the range. There must be a close study of indigenous forage plants with regard to occurrence and general distribution. Experimental work should be developed for range improvement to ascertain by what means and to what extent the introduction of species of forage plants, not native upon the range but still adapted to the conditions, may be secured. Work along these lines should, of course, be initiated on a conservative basis. Nevertheless consistent effort should be made for the improvement and conservation of the range. Close study should also be given to poisonous plants with a view to determining the best methods of extermination or control. Attention must also be given to the diseases of various classes of stock in so far as they may be the result of conditions existing on the range. A close study of such problems as these will provide us not only with valuable technical information but with some very important

practical information in grazing administration. It will be seen that this involves a general grazing reconnaissance for the whole district, and therefore, it is obviously necessary that provision should be made for it by the employment of a capable man having the requisite qualifications. It had been hoped that considerable development along these lines would take place during the coming season and arrangements were being made to assign Mr. L. Stevenson to this work. Shortly after arriving here, however, he resigned, and the result is that we have at the present time no one in view to carry on this most important work. Early in the season instructions were issued to various officers with a view to securing a representative collection of forage and poisonous plants. Results were entirely unsatisfactory, however, owing to a certain extent to the lack of time on the part of officers to make a comprehensive and systematic study.

I have previously indicated that 12,000 head of sheep were grazed in the Livingstone district of the Crowsnest forest reserve. For some years there had been a strong agitation on the part of the wool growers of southern Alberta for additional range for their sheep, and up till last season no arrangement was made whereby they were provided grazing facilities in the Rocky Mountains reserve. It was found, however, that practically no use was being made of a rather isolated grazing area behind the Livingstone range, and as this range was apparently not required for other classes of stock it was decided to create a sheep reserve on a temporary basis. Sheep were driven in by trail, the total distance being in some cases 80 or 100 miles. Strictly speaking, this branch has nothing to do with the actions of stock-men except on the forest reserve and for this reason it did not devolve upon the officers of the branch to take any particular measures for the control of the sheep until they entered the forest reserve. At that time there was practically no provincial legislation governing the trailing of sheep over the lands of the province. The result was that when large bands of sheep were brought up from the southern part of the province, crossing a country where horses and cattle constitute the main classes of the stock industry, there was considerable dissatisfaction on all sides. As there seemed to be no manner in which the sheep could be properly controlled, considerable damage was done to the property of the ranchers and farmers along the route of travel, the result being that general agitation took place against encouraging the trailing of sheep by throwing open to them forest range which was rather inaccessible to them without bringing their sheep a considerable distance through a country settled with ranchers and farmers. As a result of this certain restrictions have been imposed which will limit to a great extent the use of the range in the Livingstone valley so far as sheep are concerned. It is greatly to be desired, however, that some arrangement should be made whereby sheep will be permitted to graze on the forest reserve in those areas where the range is best adapted to that class of stock. I think that closer examination of the available range will undoubtedly show that we have many thousand acres of land where sheep grazing would be both possible and practicable, whereas the use of such range for horses and cattle would not by any means be desirable or profitable. In view of the disturbance which occurred as a result of last year's movements of the sheep, however, it will be necessary that we should move cautiously in dealing with the allotment of range for sheep-grazing purposes.

SURVEYS.

In order to provide accurate information as to the location of the main waterways and topographic features a system of traverse surveys was originated in the season of 1913. In that year the Brazeau forest and the north half of the Bow River forest were surveyed by men under the direction of this office. This left a gap between the two forests which embraced the greater portion of the Clearwater

forest where, perhaps, we had less information as to accurate location than on any division south of the Athabaska river. In the season of 1914, therefore, arrangements were made for the completion of the survey of the country between the two areas surveyed in the previous year. Two crews were organized, one under Mr. T. H. G. Clunn, which started operations toward the end of May and worked through till the month of November, and a second under Mr. A. Gorman, which started in July and wound up about the end of November. Altogether some 400 miles of main traverse lines were run. Along these main traverse lines permanent monuments were established which will have great value in determination of the absolute location of any point within reach. As a result of this work we now have traverses of the Saskatchewan river west as far as the White Goat river, the Little Brazeau river, the North and South Sheep rivers, the upper Clearwater river and numerous main trails which offered an easy path to traverse work. It was expected that the work on the Clearwater reserve would be completed in 1914 but at the end of the season there were several important waterways and trails which had not been traversed. The secondary traverse work was continued along similar lines to that of the previous year, so that for the total area covered we now have fairly accurate location of the main topographic features and also a certain amount of information as to existing timber conditions in various parts of the reserve. With the completion of this survey work during the season of 1915 survey monuments will have been established throughout the Clearwater forest so that we shall then be in a position, so far as having a basis for location is concerned, to prepare plans for the plotting of a type map for the entire reserve. The survey has also immense value in the location of administration sites, grazing areas and other features which become necessary in the ordinary course of administration. Also, by the end of this season we will have pretty clearly defined the boundary between the Clearwater forest and the forests to the north and south, namely, the Brazeau and the Bow River forests.

USES.

At the present time there are situated within the Rocky Mountains forest reserve four mining towns of considerable size. Three of these, Yellowhead, Mountain Park, and Lovett are situate on the Brazeau forest. The fourth, the town of Nordegg is located on Mire creek in the Clearwater forest. All of these towns have built up rather quickly but are laid out along proper lines. Ample provision has been made in nearly all cases for the proper housing of employees under sanitary conditions.

The only summer resort at the present time existing in the forest reserves of this district is that at Elkwater lake in the Cypress hills. This resort is situated about 35 or 37 miles south of the city of Medicine Hat. Subdivision of the resort was carried on by officers in the Surveyor General's Branch, and provision was made for some 336 lots. At the first of the year it was expected that extensive building operations would be carried out, principally by the residents of Medicine Hat, Irvine, Walsh, Maple Creek, and other small towns and villages lying to the north of the Cypress hills. Applications for about sixty lots were received within a short time. It appears however, that the general financial depression which began in this country just prior to the outbreak of the war had a decided effect in limiting the number of buildings erected. By the end of the season, therefore, there were only some half-dozen houses which had been built in accordance with the terms of agreement entered into by the applicants. As has previously been pointed out in the section of this report on "improvements," considerable amount of road and trail work was done in this resort in order to make accessible the most desirable sections for which applications had been received. The resort is very prettily situated on the north slope of

the Cypress hills, and has an irregular frontage of approximately half a mile on the shore of Elkwater lake. While on the subdivision itself there is perhaps not so much timber, nor of so large a character as might be desirable, the north slope of the Cypress hills is fairly well wooded. Good bathing and fishing are to be had in the lake itself, and there are numerous points of interest accessible from the resort. It is highly desirable, therefore, that further improvements should be carried out so that more people may be attracted to the reserve from the towns and cities to the north.

TRESPASS.

The most important trespass in the forest reserves of this district is that of the Stony Indians on the Kootenay plains. I have previously reported at some length on the situation, and it had been hoped that some action would be taken with a view to securing the removal of these Indians from the Kootenay plains. The matter involves several difficulties, however, so that it is advisable that it should be proceeded with cautiously. From the standpoint of forest administration and game protection, however, the sooner these Indians are removed from the Clearwater forest, and confined to their reserve in the valley of the Bow river, the better off we shall be. There are also a few other cases where trespass of this nature has been going on and at least two or three of them have a direct bearing and influence on the Stony Indian trespass. It is hoped, however, that it will be possible to deal with these in the near future.

Although there has been a certain amount of timber trespass throughout the district, the enforcement of seizure regulations is beginning to have the desired effect. In some cases it appears that railway operators consider that they have prior right, and that without conforming to definite and regular procedure, to any material which may be accessible to and desired by them, and the result of this is that where railway construction has gone on there has always been more or less disregard for the Timber and Forest Reserve Regulations. Two fairly extensive timber seizures have been effected in cases of this kind, however, which should have the result of bringing railway operators and their contractors to a realization that the best way of doing business is to conform to the regulations. Altogether there have been but few big seizures, but small seizures are continually taking place on all reserves where there is any extensive timber permit administration. By dealing with these smaller permittees in a tactful, but none the less vigorous manner, the amount of timber trespass will undoubtedly be decreased.

FISH AND GAME.

No clearly defined organization for the protection of fish and game has yet been formulated in connection with the administration of this district. A very comprehensive game report was submitted to the head office during the season and as conditions have in no way altered since the submission of that report it is unnecessary for me to deal further with this question. It has also not been possible for me to give any very great attention to the fish situation in the district, but it is hoped that by the end of this season considerably more study will have been given to this side of the question. As pointed out at the inspection meeting in Ottawa during the past winter, there were several inconsistencies in our fish regulations and it is hoped that these will be remedied as soon as it is possible to have the regulations amended. These changes would not, of course, involve any alteration of the principles underlying the regulations but consist merely of additions or amendments for the purpose of making the regulation more clear and definite.

EQUIPMENT AND SUPPLIES.

The most striking point which came out in the season of 1914 in connection with equipment and supplies was that on practically all the reserves there was insufficient fire-fighting equipment. In the case of the large fires which occurred on the Brazeau forest it was possible to secure tools fairly quickly, owing to the fact that there were several stores in the vicinity of the various fires which occurred. Purchase of equipment in this manner, however, generally results in securing some very inferior tools, and also the cost of tools so purchased is high. It also makes rather difficult the keeping of property records. In the case of the James river and Ghost fires it was found that the fire-fighting equipment in the districts where the fire occurred was sadly insufficient to provide for the needs, and, on the occurrence of these fires, it was in several cases necessary to purchase large amounts of tools and have the same transported by various means to the fires. This also delays considerably the operations in connection with fire fighting, for in cases where fires have to be reached by means of pack-horses it is no easy matter to provide for the quick transportation of a large number of tools.

My predecessor has previously pointed out the necessity of standardization of equipment used by the Forestry Branch. This is not only necessary in connection with ordinary office supplies and equipment but it is also desirable that as soon as possible a standard list of field equipment, which has proven to be the most satisfactory for the the various uses to which it may be put, should be prepared. There does not seem to be the same diversity of opinion as to the various kinds of tools necessary as was in evidence two or three years ago. Nevertheless it will undoubtedly be to our advantage both in the matter of facilities for conducting work, and also in the matter of expenditure, to have a reasonable classification of equipment effected as soon as possible.

EDUCATION AND PUBLICITY.

It is well recognized that, in order to secure a whole-hearted support in any movement, it is necessary to put the persons affected by it in touch with the facts of administration, as well as with the principles in recognition of which the organization has been established. There are many ways in which publicity may be obtained, by lectures, newspaper reports and accounts and by personal conversation. Unfortunately all but the last of these methods require both considerable time and energy in order that a proper publicity campaign may be organized, and owing to the inadequacy of the staff it has not been possible to organize or conduct any such campaign. It would appear that the only persons who get into close touch with the forest administration are those who may be located adjacent to the reserves, those who are forest users, and those who may come into personal contact with the forest officers. Others there are, who, by securing printed information, may keep fairly well in touch with forest work, but we cannot reasonably expect the general public to keep closely informed unless special efforts are made to attract its attention. As stated above it has not been possible to do much along these lines, but it is hoped that with additions to the staff of this office it will be possible to pay more attention to this very important matter.

In the report of last year, my predecessor referred to the establishment of a library at this office. While a certain amount of work has been done during the past year, the library is not as yet complete, nor has it been possible to put into effect a system of circulation for use of the forest officers of the district. Just as soon as possible, however, attention will be given to this matter so that I hope it will not be long before the advantages of a fairly complete library of forestry literature will be given to the forest officers and others who may desire to use it.

RAILWAY FIRE PROTECTION.

The railway work in Alberta was carried out by Divisional Fire Inspector McNaughton under the supervision of this office. As Mr. McNaughton will have furnished a detailed annual report, I will confine myself to a few general remarks as to the progress which has been made. The railways with which we have to deal in this province are the Grand Trunk Pacific and Canadian Northern from Edmonton westward to Jasper park, including the branches; the Canadian Northern from Edmonton to Athabaska, and the Edmonton, Dunvegan and British Columbia railway from Edmonton to the end of construction in the Peace River country. In addition to these a certain amount of railway work is carried out under the direction of forest officers of the Crowsnest, Clearwater and Brazeau forests. It may be stated in general that the most striking point in connection with this work is the marked advance which has been made since the promulgation of advanced railway fire regulations by the Board of Railway Commissioners for Canada. It is true that with some railways there is still much to be desired, but every effort is being put forth to obtain still greater efficiency. When it is considered, however, that the regulations of the Board have been operative through only three seasons, the advance which has been made is most encouraging. In order to see that the requirements of the board were properly carried out we had two special men who worked under the direction of Mr. McNaughton. One of these men, Mr. G. D. Taylor, carried out the inspection of the Canadian Northern and Grand Trunk Pacific railways west of Edmonton. The second man, Mr. D. Adams, conducted the fire inspection work on the Edmonton, Dunvegan and British Columbia railway. It is unnecessary to deal with the exact nature of this work for I have explained it pretty thoroughly in previous reports.

With regard to the Canadian Northern railway it may be stated that this company has established a very efficient and well-organized system of fire patrol. Their success in this line is due to the fact that a special department of fire protection was organized by that company, and it may be stated that in Alberta as well as throughout the West the effects of this organization are quite easily seen, both in its results as applied to timber protection and also in its relation to economy on the part of the company. Owing to the fact that the railway west of Edmonton is still considered as under construction, the number of other than construction employees is rather limited, and hence, on the occurrence of fires there was a certain amount of difficulty in securing sufficient force to conduct the work of fire fighting On the other hand, however, many fires were discovered by the patrolmen and extinguished in their incipiency. Although certain progress was made with regard to clearing right of way by this company, there are still some places on the line where considerable clearing must be undertaken in order to render the conditions more safe. Greater attention is being given to the quality of the coal used in locomotives, and also, considerably more efficiency has been obtained in keeping in repair the fire protective appliances on locomotives. For a railway in the process of construction, however, it may be generally stated that the fire protection service offered by the Canadian Northern was of a high standard.

In contradistinction to the Canadian Northern, the Grand Trunk Pacific, which runs almost parallel to the former railway has been under operation for some time past. Furthermore, large numbers of employees are available along the line, so that in the case of an outbreak of fire it is considerably easier for this company to gather together sufficient forces to bring such fires under control. Unfortunately even with these facilities the patrol service which has been put into effect by the Grand Trunk Pacific has never been entirely satisfactory, due primarily to the fact that but little care or attention has been given by the officers of the company to the details of organization for this work. Last year patrols were established in compliance with the requirements of the Board of Railway Commissioners, and, although it is undoubtedly

true that many fires were extinguished by these patrolmen, it is certainly evident that insufficient care was taken to provide a proper organization to control these men, both in their actual patrol duties and in their relation to the rest of the company's employees generally. The main difficulty seems to be that the Grand Trunk Pacific has not as yet recognized the necessity for the formation of a special department of fire protection to be handled directly by one man who may develop a certain amount of expertness in dealing with such work. As a railway organization the Grand Trunk Pacific is, of course, pretty highly developed, and it is only fair to state that in the majority of cases where fire broke out they were not very long in having a large number of men on the ground for fire fighting. Also the work done in clearing the right of way by this company has been for the past season of a high standard. The only thing which is necessary, therefore, to effect an organization for fire protection of very efficient character is that a little more attention should be paid to the patrol system. An exception might be made to the statement in regard to patrol in the case of the Alberta Coal branch. On this line the patrols were carefully supervised by the roadmaster and, with the exception of one bad fire which occurred, the results which were obtained on that line were very satisfactory.

The Edmonton, Dunvegan and British Columbia railway, being in the process of construction, and also until recently having rather a loose organization, was the hardest proposition with which we had to deal during the season. Although the company was given instructions with regard to fire protection during the season of 1913, the organization which was developed for this work amounted practically to nothing. Unfortunately the season of 1914 started off with a very dangerous period during the months of April and May. Full instructions had been given to the officers of the company, and every effort had been made to put them into close touch with the character of the requirements. The results obtained, however, were very far from satisfactory and the sum total of the situation was that in practically no respect did this company pay any attention to the requirements of the Railway Commission of Canada or of the Railway Act. Very inferior coal was used, the fire protection appliances of all engines were in a continual state of disrepair, the organization for a patrol system was more or less a dummy organization, comprised of men whose main duties made it necessary for them to conduct other work than fire protection. The result of this situation was that, on the occurrence of this very dangerous period, hundreds of fires broke out all along the line, and great damage was done to the surrounding country. During the season the railway company were repeatedly advised by the Board of Railway Commissioners that it was necessary for them to provide an organization which would meet the requirements. Such orders were, however, ignored practically throughout the whole season, and as a result of this the company was summoned before the Railway Commission during its session in the city of Edmonton last November. The details of this case have already been reported to the head office, and it is only necessary to say here that a very serious reprimand was given by the Board of Railway Commissioners to the company. I might say in closing that as the fire season of 1915 is already well advanced, I am in a position to say that the attitude exhibited by the officers of this company is at the present time decidedly different from the hostile attitude which existed last year, and, if the same progress is made throughout the season as has been made during the first part of this year, there is no reason why the state of organization on this railway should not be brought to the same level as has been obtained on the Canadian Northern.

FIRE RANGING.

As in the previous year, the fire-ranging organization in this province was divided into three large districts: Edmonton, McMurray, and Slave. In charge of each district was a chief fire ranger who had entire control of the operations for his district. In

previous reports I have described at some length the conditions existing in the northern part of the province. No material change has taken place with regard to these conditions nor has any serious change in the extent of the district been effected with the exception that the Lesser Slave reserve, which was brought under the forest reserves administration during the past year, caused a decrease by approximately 5,023 square miles in the area of the Edmonton district. On the other hand, the patrol system of the Edmonton organization was extended farther northward, so that there has been little actual decrease in the area of this very large district. The McMurray and Slave districts remained essentially the same as in the previous year. Including the chief fire rangers a total of about sixty men were employed in the fire-ranging organization, forty-five of whom were attached to the Edmonton staff, eleven to the McMurray district, and eight to the Slave. As the control of such a large number of men distributed over such a large area as the Edmonton district is a difficult matter, the chief fire ranger was assisted by two sub-chiefs, one in the northern and one in the southern part of the country. The method of patrol adopted varied, of course, with the character of the country. In some places travel was almost entirely by canoe, as for instance in the McMurray district. Also in the Edmonton district a certain amount of patrol is carried out in this manner, although the majority of men find it necessary to resort to travel by horses or on foot. Another method of patrol, which obtains on the larger rivers, is that of steamboat; and on the Athabaska river, fire patrol boat No. 1 continued operations as in previous years. In the Slave district, also, the rivers are very large, so that travel by canoe would be attended with very great difficulty. The entire patrol is carried on, therefore, by means of two steamers, one operating from Fort Smith northward to Great Slave lake, the other operating from Smith Landing southward on the Great Slave, Peace and Rocher rivers and on lake Athabaska. In these northern districts the timber is more or less widely scattered, so that patrol is necessarily very extensive. In the McMurray district a small addition was made by providing a substantial motor canoe for use of the chief fire ranger. This canoe makes it much easier for the chief ranger to get about from one part of his district to another and in this manner keeps him in closer touch with the operations over a somewhat extensive district.

Just as has been explained with regard to the forest reserves, the fire situation throughout the northern part of the province was serious. This was particularly the case in the Edmonton district where on account of the presence of many agents in the cause of fire, the fires were very many and the damage quite extensive. Farther north, in the McMurray and Slave districts, the same difficulties were not so keenly felt, owing to the fact that there is very little settlement, no railways and, speaking generally, the agents in the cause of fire are somewhat few. Fire control in districts such as these is, during a dangerous season, a most difficult proposition. On the one hand there are railways under construction, while, on the other hand, there are settlers pouring into the country who are very careless in the use of fire both in clearing land and in camp fires. Under the heading of "Railway Fire Protection," I have already explained that the Edmonton, Dunvegan and British Columbia railway, which is under construction from Edmonton to the Peace River country, was the source of many dangerous and extensive fires. Another railway is also being constructed northward, namely, the Alberta Great Waterways railway. This latter railway is under provincial charter, and hence not subject to the fire provisions of the Railway Commission of Canada. It does not appear, however, that along this particular line the damage from fire has been very great. Although statistics at this office with regard to the number of fires and fire damage are very meagre, it would appear that nearly 500 fires occurred throughout these three districts, and that in some parts very considerable areas were burned over. Comparison with the fires which occurred on the reserves would show that the fires outside are very much more numerous. This is the natural result of the presence of so many agents in the cause

of fire. Another great difficulty in the solution of fire protection problems outside the reserves is the fact that, as the lands are not completely under our administration, it is both difficult and unprofitable to go to any very great extent in providing elaborate improvements for fire protective purposes. In other words, owing to the fact that the districts are so very large it is necessary that the majority of funds should be expended in the provision for fire rangers. The natural result is that we have to depend on these men for the construction or improvement of trails, and, having such large districts, it is quite evident that they can do but little to open up a proper trail system for their individual districts. They have instructions with regard to the improvement of trails in their various districts at times when the fire danger is not great.

The past season was the first, since the reorganization of the districts in 1912, that the organization has been subjected to any severe test, and this must be further qualified by stating that it was only during two or three periods of the season that the fire danger became very serious. It had been hoped that, with the effort which had been made to develop this organization, it would be possible to meet a danger period fairly and squarely and with some success. Although results were in some districts satisfactory, the fact remains that there were numerous incompetent men on the staff. It is almost unnecessary to say that in order to effect a proper organization of the fire-ranging forces, it is essential that only first-class men should be employed. Owing to the nature and extensiveness of the work these men must of necessity, be left to a considerable extent to use their own judgment. It is impossible to arrange for organization in a fire-ranging district on the same basis which applies to reserves. It is all the more necessary, therefore, that the men appointed should be of a high standard, morally, physically, and mentally, and that only such men as accomplish definite and favourable results should be retained in a position which, to say the least, involves the protection and conservation of one of our greatest natural resources.

Respectfully submitted,

E. H. FINLAYSON,
District Inspector of Forest Reserves.

REPORT OF DISTRICT INSPECTOR FOR BRITISH COLUMBIA.

KAMLOOPS, B.C., June 12, 1915.

SIR,—The work of the Dominion Forestry Branch in the Railway Belt of British Columbia was carried out with the same organization as explained in my annual report of last year. No new outstanding policies were inaugurated during the year.

Questions in regard to the administration of grazing and in regard to agricultural lands in forest reserves are still unsettled, although recommendations have been submitted for changes which will largely obviate any difficulties in connection therewith. Statutory authority is, however, required.

The different phases of work in this district will be taken up separately.

RESERVES.

Personnel.—During the past year the forest reserves were administered by a staff consisting of a supervisor, three assistants and nine rangers. At the outbreak of the

war this staff was decreased by the departure of one assistant and one ranger who enlisted for overseas service. At the end of the fire season it was possible to further reduce the staff by two rangers. The rangers were placed, one on each of the eight large reserves and one on the Larch Hills and Mount Ida reserves. The ranger staff was found for the most part satisfactory. Two men found incompetent were replaced by others who give promise of being more suitable.

Agricultural Lands.—The question of agricultural lands in forest reserves was gone into thoroughly during the field season of 1914. A special investigation survey was organized which examined and reported separately on every quarter-section about which there was any doubt as to its value for agricultural purposes. The results of this examination were submitted to the head office in the report of Forest Assistant D. W. Lusk, which gave a very clear and comprehensive statement of conditions. As the result of this survey, recommendations were made for the elimination of 12,960 acres from the forest reserves. The necessary statutory authority for their withdrawal has not yet been obtained. I am confident, however, that when this action is taken the controversy over agricultural lands will settle itself, and any difficulty in this connection will be done away with.

In my report for last year I stated that the total area of lands of any agricultural usefulness within the boundaries of the forest reserves would not amount to 1 per cent of the reserve area. This statement is borne out entirely by the investigation made last year. The lands recommended for elimination were not all considered by forest officers to be actually valuable agricultural lands but were included in such recommendation because there is an insistent demand in the country that permission should be given to test their value for agriculture. It was therefore considered advisable to accede to this demand rather than to continue a ground for adverse criticism of the administration even though such criticism is based on insufficient reasons.

It seems to be the experience of every forest administration that when a tide of settlement strikes a locality the momentum thereof must naturally carry the bounds of such settlement beyond the limits justified by the nature of the country. A final state of equilibrium, satisfactory and recognized by the whole community, can only be attained after poor lands adjacent to a new community have been thoroughly tried. It is better policy to realize this and to sacrifice in the early stages of settlement a few acres of forest land rather than to build up an antagonism to the forests which would take many years to eradicate.

Grazing.—Owing to representations of the stock industry, the enforcement of the grazing regulations on forest reserves was postponed during the season of 1914. The whole matter was considered anew at a meeting at Ashcroft, B.C., on June 3, which was attended by the Director of Forestry, the results of which were inconclusive. Since that meeting, the primary feeling of opposition to the regulations has somewhat abated, and I think I may safely say that following a special investigation and report by a competent grazing expert, as decided upon and agreed to by the industry, a basis of common understanding, satisfactory both to the stock-men and the Forestry Branch, can be obtained. The final settlement hinges to a very large extent upon the ability and personality of the man who would make such an investigation.

Improvements.—Owing to the severity of the fires last year, improvement work was seriously retarded, the whole staff being required for protection work most of the season. The work done consisted of building a ranger station house, a stable, and two cabins. An incomplete house was finished. About 50 miles of trail and 8 miles of wagon road were also constructed. The expenditure on buildings was $1,470, and on trails and roads, $2,450. The routes of the various trails were all selected by tried men and approved by members of the administrative staff before work was begun. Construction work was efficiently and economically handled and the results eminently satisfactory.

Summer Resorts.—The summer resort at Trout lake in the Long Lake reserve is progressing satisfactorily, despite the hard times, and last year four neat summer homes were occupied by Kamloops residents. Two more are promised for the coming year.

Fires.—The fire season of 1914 was one of the most hazardous observed since records have been kept, and many fires occurred in all parts of the province. Protection work occupied, practically, the entire staff from early in June until about September 8, when there was a heavy rainfall.

The area burned over in the district covered by the reserves staff of this district was in the neighbourhood of 35,000 acres, divided among twenty-nine fires. Fire-fighting expenditure was nearly $7,000. Very little merchantable timber was burned, the areas affected bearing a stand which in most cases would not run more than 2,000 feet board measure per acre. The fires were all due to human agency, about two-thirds being attributed to campers and travellers, and the remainder to incendiaries and settlers clearing land.

The lookout system of detecting fires could not be used last year, but the sites for the various lookouts were located, and when these stations are fully equipped they should materally decrease the number of fires which reach dangerous dimensions.

Silviculture.—One timber sale was arranged on the Fly Hills forest reserve, by which about 200,000 feet of yellow pine was sold to a box manufacturer in Salmon Arm. The sale is at present well under way, and inspection shows that the company has lived up to the terms of its contract satisfactorily. Permit business is still very small, the only demand being for cedar on the Niskonlith reserve which appears to contain most of the available supply.

Disbursements.—During the past year disbursements to the amount of $16,228 were made from this office on accounts connected with the British Columbia reserves. The clerical work connected with the accounting was done entirely by the staff of the inspector's office. The new system of accounting was installed and working well at the beginning of the year but, owing to the departure of one clerk, and then the other, to enlist for active service the book-keeping was somewhat disorganized. The system, however, was found to work satisfactorily.

Surveys.—The work of delineating the boundaries of absolute forest land within the Railway Belt was continued during 1914 and brought to a successful conclusion. This was carried out by a survey party in charge of Student Assistant C. R. Mills, assisted by Student Assistant R. A. R. Campbell, both of the Forest School, Toronto. They completed the examination of the Railway Belt east of Revelstoke, exclusive of Dominion parks. As a result of this survey, Mr. Mills recommended the inclusion of 2,638 square miles in forest reserves.

As noted above in my remarks under "Agricultural Lands," a special survey was organized to make an intensive examination of agricultural lands in the Tranquille reserve. This survey was in charge of Forest Assistant D. W. Lusk, assisted by Student Assistant A. M. Thurston, Student Assistant J. L. Hughes and Mr. Jas. Smart. This survey made a detailed examination of every quarter-section in this reserve by the following method: Primary controls were established by the use of Dominion survey lines and traverses run by azimuth. At intervals of one-half mile compass lines were run. Two right-angled offsets from both sides of these compass lines were made of a length varying from 10 to 40 chains in accordance with the distance deemed necessary to give an adequate idea of the conditions throughout each quarter-section. Two aneroid barometers were used to ascertain elevations, and complete field notes covering all factors entering into land classification were recorded for each quarter-section.

The examination of lands in other reserves which occurred in small areas only, was made by Forest Assistant D. W. Lusk, assisted by Mr. Jas. Smart. Supplementary trips were made in October by Mr. Lusk, in company with Forest Assistant L. Stevenson, soil expert from the head office. As a result of these inspections we now have complete and accurate data regarding these areas.

Another survey party was engaged during the summer exploring and investigating the various timber types in the Hat Creek forest reserve, studying the protection problem, and examining land which had been reported as better fitted for agriculture than forestry. The object of this survey was to delineate the boundaries of the timber types, to ascertain what permanent improvements should be made to complete the protection scheme for the reserve, and to take notes of the possibilities of the reserve for stock grazing. This work was carried on under Student Assistant Thurston, accompanied by Student Assistant Hughes. The examination was made with great care, a very satisfactory map and report being submitted. The survey showed that very little merchantable timber existed on the reserve and that repeated fires had ravaged almost the entire area. The report also showed the reserve to contain some 80,000 acres of upland grazing, suitable for summer range. The area of lowland range, however, is very limited. The protection map submitted is likely to be of considerable value in preparing the final fire plan of the reserve.

Nicola Land Examination.—This work was conducted by Mr. Thurston and his party for the purpose of ascertaining the agricultural value of township 20, ranges 22, 23 and 24, west of the sixth meridian, and a portion of the Guichon Creek valley.

A careful examination was made of the entire area, with the result that a number of quarter-sections mentioned in the report were recommended for elimination from the reserve. By far the greater part of the land examined, however, was considered more suited for forest reserve purposes, and will be retained. The factors considered in Mr. Thurston's decision were: soil, slope, altitude, timber, and availability of water.

A winter reconnaissance survey was conducted in the Fly Hills reserve under the direction of Mr. Wallensteen, with a party consisting of the chief, three rangers, and three temporary men. The results obtained were very satisfactory, a map of the timber types on the reserve being obtained with a preliminary estimate of their contents in board feet. It is believed that the reserve contains merchantable spruce and alpine fir amounting to about two hundred and fifty million feet. In addition to the estimates, the topographic map was corrected and the trails traversed. The work was of considerable value to the rangers who assimilated a good deal of information on the subject of reconnaissance surveying.

Fish and Game.—The lakes within the forest reserves were placed last year under Forest Reserve regulations by which they were closed for fishing in the spring until June 16. A permit to fish was also required, the fee being 25 cents. The regulation by which the close season was prolonged has proved for the most part to be a wise one, and has received the support of all right-thinking sportsmen. The fishing permit, however, was not so satisfactory, due to the fact that no permit whatever is required to fish in lakes outside of reserves. In cases where lakes inside and outside the reserves adjoin a condition arises which is hard to explain to a casual observer. It has been decided to recommend the discontinuance of the permit system, although rangers will be expected to see that the regulations regarding out-of-season fishing and per diem catch are observed.

Education and Publicity.—The entire staff continue to place the aims and policy of the Forestry Branch before the people of the province, and results are now beginning to be seen in a greater interest and willingness to co-operate on the part of the settlers.

FIRE RANGING.

The fire season of 1914 in the Railway Belt was the most dangerous in the history of fire protection in this country. Meterological data show that the hazard was higher than during 1910. Practically no rain fell during July and August. As a result of these abnormal conditions, forest fires occurred with great frequeney throughout the country. During the latter part of the season, particularly, it was impossible to extinguish these fires. They had to be confined within definite limits and constantly guarded until the rains in early September put them out. Notwithstanding these difficult circumstances the total damage from fire was very small. The fires were confined to slash or brush areas, and were in most cases kept out of the merchantable timber. Credit for this is due to the efficient work done by the fire-ranging staff of the department. The principal loss from these fires was the expense of controlling and extinguishing them. One hundred and fifty-three fires causing expense were fought during the season in the Railway Belt at a cost of over $44,000. The fire-ranging work was carried out under the same arrangements as last year.

The following is a summary of the work by districts:—

Coast District.—A great improvement in administration was effected at the beginning of the fire season by the handing over of the authority for issuing fire permits to Dominion rangers. This action by the British Columbia Forest Branch was in line with the policy of last year, when this change was made in the upper country, and the arrangement succeeded admirably in the Coast district, being not only a cause of greatly increased efficiency in protection by our organization, but also a valuable economy to the Provincial Government.

The fire record for the year shows that the work of these rangers was very well done. Out of 230 fires taken care of, only twenty-eight caused extra expense. Some of these latter, however, attained a large size, and were very hard to control. The following is a list of fires by causes: settlers, 62 fires; campers, 63 fires; unknown, 46 fires; railways, 23 fires; logging operations, 14 fires; other causes, 22 fires; total, 230.

An area of 18,493 acres was burned over, 3,405 acres containing merchantable timber, and the remainder young growth, brush, slash, etc. The actual loss of merchantable timber was 6,341,000 feet board measure, 1,470,000 feet of which was private property, and the remainder, namely 4,871,000 feet, was under license or on vacant Dominion lands. On vacant Dominion lands and lands under license, 15,630,000 feet of timber was damaged. The greater part of this timber can be saved if logged within a reasonable time. The total amount of money spent on fire fighting in the Coast district was approximately $4,900.

The amount of money spent on fire fighting entailed a corresponding reduction in the amount available for improvement work in the Coast district, with the result that not much could be done in this connection. A large amount of work, principally in providing better means of transportation, is still necessary in this district before the work can be carried out to the best advantage. A start was, however, made at the close of the fire season when the trail up the Chilliwack river was cleaned out, and several other small trails were constructed where the need was most urgent.

Rangers' meetings were held at the opening and close of the fire season. These were attended by all the rangers, and were very interesting and instructive. Among the matters brought up at the fall meeting was the necessity for the construction of trails and telephone lines; the grave situation along the boundary arising from the frequency with which fires from the United States crossed the line and did damage to timber; and the setting out of incendiary fires, largely for the purpose of obtaining employment. This last point was strongly brought out, and a resolution was passed requesting the employment by the department of a secret service agent, whose business it should be to bring offenders of this nature to justice. The

rangers themselves considered that they had very small chances of coping with this situation on account of their being so well known in the districts over which they have charge. These matters have been taken up with the department in due course.

Salmon Arm.—The fire-ranging work in this district for the season of 1914 was undertaken on the same basis as outlined in my report for last year. This district was by far the worst sufferer from forest fires of the three under my supervision. Eighty-one fires occurred which caused extra expense. The total cost of fire fighting in the Salmon Arm district amounted to over $28,000. The causes of serious fires as far as can be ascertained are as follows: lightning, 12; incendiary, 13; unknown, 21; campers, 4; settlers, 11; meteor, 1; Indians, 15; engine, 1; smokers, 3.

Practically all these fires occurred during the month of August. In many cases one ranger had several large fires on his hands at the same time. The emergencies proved so great that the fire rangers were unable to spare the time to attend properly to the office work and reports in connection with the fire, with the result that a special field survey of the damage done has to be made before final figures can be arrived at. This investigation is now under way. The clerical assistance afforded the chief ranger was also unsatisfactory and as the chief ranger was entirely occupied with fire fighting, matters became very congested. As the outcome of this experience it has been decided that a separate and complete office will have to be provided for the chief ranger.

The great overrun on the allotments for this district prohibited the construction of improvements. The only work done was the cleaning out of the trail up the north fork of the Eagle river, which was completed by Ranger Mizon before the fire danger became acute. The placing of the launch *Eve* on Adams lake saved the department a very large amount of money for fire fighting and fire protection.

A rangers' meeting was held at the close of the season in Salmon Arm. Discussion centered on the necessity of assistance to the rangers in times of great danger, such as the month of August, 1914, and a resolution was passed requesting that the department appoint temporary guards to assist rangers during the "peak" of the fire season. The large number of incendiary fires was also dwelt upon, and a resolution similar to that of the Coast district for a secret service agent was also passed. It was pointed out that the Indians had been particularly troublesome during the season, the reason given being that 1914 was the first summer for some time during which the forest dried out enough to allow the Indians to burn mountain sides for the purpose of securing berry-picking grounds. Their old berry grounds had been encroached upon by a luxuriant growth of brush consequent upon two or three wet seasons preceding.

Revelstoke.—The fire ranging work in the Revelstoke district was continued under the supervision of Chief Ranger Wadman, of Revelstoke, the same as last year. One extra ranger was appointed in the vicinity of Golden. One hundred and fifteen fires were reported during the season, thirty-five of which caused additional expense. The total amount spent on fire fighting during the season was approximately $6,400. The causes of the fires are as follows: lightning, 44; campers, 24; railways, 2; logging engines, 1; settlers, 7; sectionmen, 1; old fuses, 2; unknown causes, 34; total 115.

These fires burned mostly in slash and destroyed a great deal of it which was a source of danger. As a result, the settlements in this district are much freer from the danger of forest fires than before.

Considerable improvement work was carried out in this district during the year. The principal project was the Donald trail, 21 miles in length, which connects Donald with Golden, along the west bank of the Columbia river through a hitherto inaccessible country, covered with a heavy growth of exceedingly valuable timber.

Two cabins were constructed for rangers whose headquarters are at points removed from settlement. Particularly useful was the Big Bend telephone line constructed the previous fall. This line was put into commission early in the year and more than paid for itself during the month of August. Two boats for the use of rangers on the Columbia river were supplied, one of which was equipped with a detachable motor.

At the rangers' meeting, held at Revelstoke at the close of the season, stress was laid upon the necessity for the appointment of short-time guards during periods of great danger. Reports from all the rangers stated that improvements constructed previously had greatly facilitated their work and had saved the department a large amount of money. The necessity of providing tool caches in unsettled localities was emphasized, and the rangers were promised that adequate action would be taken in this connection. Provision was made for the clearing of snow off several of the large bridges across creeks in the Selkirk mountains. This was on the recommendation of the rangers, who stated that a great snowfall was liable to break down these structures, with results which would be disastrous to the efficiency of the protection in the future.

Slash Burning.—In accordance with the policy adopted by the department to take active steps in coping with the slash menace in the Railway Belt, Mr. Frank Ashdown, of Golden, one of the most experienced fire rangers in the country was appointed as slash burner for the Railway Belt, with instructions to work under the supervision and direction of the chief fire ranger of the district in which he might be burning slash. Early in the season, Mr. Ashdown was sent to the state of Washington, where he accompanied officials of the Washington Forest Fire Association and saw, on the ground, how the work was carried out there. On his return, Mr. Ashdown examined a large number of areas of slash, but, unfortunately, the season became suddenly so hot and so dry that it proved too hazardous a task to attempt action on his plans until weather conditions should be more favourable. During the fire season a large proportion of these slash areas were burned over. There was, however, a loss to property which could have been saved if Mr. Ashdown's plans could have been carried out. During the dry season Mr. Ashdown was employed as foreman in charge of the construction of the Donald trail. Again in the fall, plans were made for the burning of a few areas of slash which had escaped the summer fires. Here also the weather intervened, the fall rains setting in with such intensity that the project had to be abandoned for the season. The net results of this new policy were, therefore, very small, but it is expected that the work can be performed in the future with great benefit to the lumber industry as well as to the Forestry Branch.

Railway Fire Ranging.—The co-operative agreement with the Board of Railway Commissioners for the handling of railway patrol requirements of general order 107 was continued throughout the fire season of 1914. In my report for last year I took exception to the requirements specified by the Railway Commission for fire protection as being inadequate to meet the situation. My reasons therefor were three-fold, as follows: Labour movements in connection with double-tracking and tunnel construction; intermittent use of coal-burning locomotives over oil-burning divisions; and bad right of way conditions. All these conditions were very much ameliorated during 1914, with the result that although the fire season was the worst in years the number of railway fires was practicably negligible. Money stringency and war conditions prevented further construction by the Canadian Pacific Railway. The conversion of coal-burners to oil-burners was completed, and the right of way was very well cleaned up before the opening of the fire season, except in a few localities. Another improvement was the turning over of the supervision of the railway patrol work of the Canadian Pacific Railway to be consolidated under the direction of the Superintendent of Forestry of that railway. The appointment of special fire inspectors under him

gave satisfactory opportunity for me to go to a responsible official when a situation arose which needed a remedy. The Canadian Pacific Railway Company are deserving of great commendation for the strong action they have taken to live up to the letter of the requirements of the Railway Board and of the Railway Act, especially with respect to right of way conditions.

The fires reported as occurring along the railway lines during the season are as follows: locomotives, 22; carelessness of railway employees, 7; tramps, 13; settlers, 2; unknown, 19.

Respectfully submitted,

D. ROY CAMERON,
District Inspector.

REPORT OF THE SUPERINTENDENT OF THE FOREST PRODUCTS LABORATORIES OF CANADA.

MONTREAL, June 28, 1915.

SIR,—I have the honour to report on the progress of work in the Forest Products Laboratories of Canada for the year ending March 31, 1915.

INTRODUCTION.

I took up my duties as superintendent of the laboratories at the beginning of the fiscal year, April 1, 1914, following the resignation of Mr. A. G. McIntyre. My predecessor is to be congratulated on the excellent start which has been made in organizing the first divisions of the laboratories, and in providing for future needs. At the beginning of the year the nucleus of technical and office staff was on duty, a number of important machines and other pieces of apparatus had been received or ordered, and general plans had been laid for the first investigations. No permanent quarters were ready for occupancy, but arrangements had been completed with McGill University for accommodation.

The plan of co-operation with McGill University on which the laboratories were founded has proved to be a very satisfactory one, and this union of Government and university in scientific research may be considered as marking an era in Canada's development. The relation of the laboratories to the university is flexible, and the co-operation is primarily one of good-will, the university having provided temporary quarters for our laboratory work and the Federal Government, through the Forestry Branch paying all salaries and furnishing all equipment. In this way the members of our staff have facilities for carrying on experimental investigations along the lines of forest products in a university atmosphere which has decided advantages for this kind of work. The university, on the other hand, has the chance to keep its students in close touch with the work which we are doing, by personal inspection, through occasional lectures delivered to the engineering students by members of our staff, and by reason of a certain number of specially qualified students and graduates being appointed on our technical staff. The mutual advantage of such an arrangement will be at once recognized. The Forestry Branch owes a debt of gratitude to McGill University for the material and sympathetic co-operation shown to the Forest Products Laboratories by the university authorities and by individual members of the faculty.

There has been more or less misunderstanding during the early stages of organization regarding the exact function of the laboratories. The Forestry Branch has been interested mainly in such problems as administration of forest reserves, fire protection, tree planting, reforestation, and, in general, the educating of public opinion in the proper care of living trees. The Forest Products Laboratories, on the other hand, is a new division of the Forestry Branch which is interested in the conservation of forest resources by proper utilization of the raw material. The work is therefore largely of a chemical and physical and engineering nature, and has to do with the intensive study of wood itself and the many products which can be manufactured therefrom. Investigations have been undertaken with the view of extending the knowledge of wood and its products, pointing out improved methods for using the raw material furnished by the Canadian forests and finding ways and means of utilizing the vast amount of waste wood which is occasioned in the lumber and allied industries.

At the beginning of the year a slight change was made in the name of the laboratories. The original designation "Forest Products Laboratories" was changed to "Forest Products Laboratories of Canada," so that there would be less confusion with the Forest Products Laboratory maintained by the United States Government at Madison, Wisconsin, and in order to indicate more clearly to the Canadian people the scope of this new government division.

The year 1914-15 has been mainly a period of organization and preparation for systematic scientific work. The progress has been somewhat slow, owing to the newness of this type of work in Canada and the small supply of specially trained technical men, as well as to the general depression caused by the present war. However, I think it will be apparent from the discussion which is to follow that a real beginning has been made in this work which is of such vital importance to Canada.

PERSONNEL.

At the beginning of the year the staff numbered ten, made up of seven technical men and three office assistants. Most of these had been but recently appointed. During the summer of 1914, a number of additions to the staff were made, and others were added later, several commencing duties in the last two months of the fiscal year. On March 31 the permanent staff totalled twenty-three, including seventeen technical men and assistants, and six non-technical office assistants. Three of our technical men have been absent since the outbreak of war on military leave. These are Mr. F. W. Fraser of the division of Timber Tests, and Mr. D. M. Trapnell of the division of Pulp and Paper, both of whom enlisted with the 14th Battalion, first Canadian contingent; and Mr. L. N. Seaman, assistant chief of the division of Timber Tests, who was called to duty at Halifax with the first Canadian Garrison Artillery. A number of technical assistants and other employees were engaged for short periods during the year as occasion demanded.

ACCOMMODATION.

For a number of months the staff found temporary accommodation in the old medical building, granted for our use by McGill University. The space included two rooms used as offices and two small laboratories used for draughting and preliminary laboratory work.

Late in the summer a start was made, under direction of the Department of Public Works, in remodelling the old Molson property at 700 University street for accommodation of the laboratories. This property was purchased by the university some months previous, and was very generously turned over to the Forest Products

Laboratories for a period of four years. The property measures about 200 feet frontage by 100 feet deep, and has a very good location on University street, immediately at the rear of the McGill Physics building. The residence building is a large stone structure containing about twenty-five rooms in all. The main part of the building was put in shape for our work, at a very moderate cost, by interior wiring, painting, laying of floor coverings, and making minor changes in arrangement. Late in October the staff moved into this office building, and since that time various changes have been made to meet our needs. Two rooms in the basement have been provided with concrete floors, benches, piping, etc., for use as wood preservation laboratory and fungus pit. On the ground floor one room is used as clerk's office, and a large room has been set aside for exhibits of forest products. The first floor provides four offices and a room for library and conferences, while the top floor contains two offices, draughting room, chemical laboratory and dark room for photographic work.

The original plan of providing for the experimental paper-mill in the main building was abandoned in favour of remodelling the adjoining coachhouse. To this end, detailed plans were drawn up during the summer and the reconstruction of this building commenced early in November under the supervision of the Public Works Department. The building was a solid structure of brick and stone, two stories in height and about 60 feet by 30 feet in size. The interior was almost completely reconstructed, and the back wall was removed to allow the addition of an extension 30 feet by 30 feet. New water, gas, and drain connections were laid to the street. A steam line was laid from the university main for heating and general mill purposes. Electric power and electric light connections were made with the power company's lines. A concrete floor was laid in the enlarged ground floor of the building, and piers, etc., were placed for the installation of paper machine, beaters, and other equipment. By the end of the year the experimental paper mill was fairly complete and the machinery nearly ready for operation.

For the work in timber testing, the university placed at our disposal the testing laboratory in the Engineering building, which provides most excellent facilities for this branch of our work. Space for a wood-working shop was also procured toward the end of the year in the building adjoining the experimental paper-mill, and reconstruction work was commenced in March. A portion of our yard space has been in use for the storage of wood, special precautions being taken to prevent fungus infection. A shed for the air seasoning of small wood specimens was also designed late in the year. A small saw-mill on the outskirts of the city in Outremont has been in use since last summer. Storage space is provided close to railway siding for logs which are obtained for testing purposes, and we have installed a large saw for working up this large-size material as desired.

The progress of work in the laboratories will no doubt be made clearer by separate discussion of each division. The organization includes administration, and the technical divisions—timber tests, timber physics, pulp and paper, and wood preservation.

ADMINISTRATION.

The division of administration is concerned with the general operation of the laboratories. The staff includes the writer, who, in addition to his duties as superintendent of the laboratories, acts as chief of the division of Pulp and Paper, Mr. W. B. Campbell, assistant superintendent and chief of the division of Timber Physics, librarian, two stenographers, clerk, office boy, and janitor. Accommodation is provided in the main office building, five rooms being used as offices, one as library, one large room for exhibits of products, and the back part of the building being used by janitor and family.

Considerable attention has been paid to filing system for correspondence, particularly in making available the information on forest products. All orders and accounts are handled by this division.

A favourable start has been made in collecting a library containing information on the special work which concerns the laboratories. The main library of McGill university is consulted for general reference works, so that the task of accumulating a special library is very much simplified. Several hundred books are now on hand. Some thirty-five technical journals are received, and a large number of current pamphlets, bulletins, clippings, etc., have been added to our collection. A new filing and indexing system has been adopted during the year. The abstracting and indexing of current and past technical literature has been carried forward, and a special system has been developed whereby the information on specific subjects is being made more nearly complete and is kept up to date. The field of forest products has been divided into twelve divisions, and these have been further classified. Each division has been allotted to some member of the technical staff for the study and recording of literature. Considerable time and thought has been given to library matters, as accurate and comprehensive knowledge of available information is necessary in connection with the laboratory work and the answering of inquiries, which are received in large number.

Preliminary plans have been made for the collecting and exhibiting of wood specimens, samples of treated wood, pulp and paper, wood distillates, and the numerous products which can be obtained from the raw material furnished by our Canadian forests. To this end a large room on the ground floor has been set aside as a special exhibition room, and the halls and other rooms will also be brought into service to some extent. A considerable number of miscellaneous samples are already on hand, but progress in this connection has been delayed in favour of experimental work.

TIMBER TESTS.

The personnel of the division of Timber Tests included at the end of the year division chief, Mr. R. W. Sterns, assistant chief, university laboratory supervisor, three testing machine operators, and draughtsman.

An office and draughting room are in use in the main building. The university testing laboratory in the McGill Engineering building is employed for the actual testing of specimens. A large saw was installed during the summer in the Ontremont mill for the handling of logs. In the early part of the year the university wood-working shop was used for the final preparation of wood specimens for testing. Later on it was found more feasible to make use of a shop nearer the saw-mill. In the near future we shall have a wood-working shop of our own, with complete equipment for working up test specimens on our own premises. Storage space for wood specimens has been available in our yards. The shed for air seasoning of small specimens will also be used by this division. The university machine shop has been used during the year for machine work.

During the spring and early summer our Hatt-Turner impact testing machine and 30,000 pound Olsen universal machine were installed in the university testing laboratory. The 200,000 pound Wicksteed and 150,000 pound Emery machines, which form part of the university equipment, have been in frequent use for timber testing. Arrangements have also been made for adjusting the university's 60,000 pound Riehle testing machine for our work. With very little effort and expense on the part of the laboratories there has been made available the most complete and satisfactory testing equipment in Canada, and too much cannot be said of the generosity and courtesy of McGill University in placing these excellent machines at our disposal. New equipment received for the division of Timber Tests includes a variety of machine attachments and a number of slide-rules, planimeters, etc., for the computation of results.

The spring and summer months were spent in installing testing machines, adjusting gears, designing and fitting special attachments, and in carefully calibrating the testing machines. A system of working plans, progress reports, forms, etc., for the carrying on of investigations was worked out and corresponding systems are now being used in the other divisions.

Project No. 1 "Mechanical and Physical Properties of Canadian Woods as Determined by Tests on Small Clear Specimens" was undertaken for the purpose of establishing authoritative strength characteristics of the important Canadian wood species. The testing procedure includes eight strength tests—static bending, compression parallel to grain, compression perpendicular to grain, shear, tension, impact bending, cleavage, and hardness. The first species under test is Douglas fir, representative shipments of logs having been received early in the summer from three typical localities in Alberta and British Columbia. Testing commenced early in September, 1914, and 1,186 tests were completed by March 31. The results have shown that the fast-growing Douglas fir of the coast has unusual strength, and that the slower-growing and smaller mountain types, although more affected by knots and other defects, have very favourable strength characteristics. The tests confirm the fact that our Canadian Douglas fir is a first-class structural material.

Project No. 2 "Strength Functions and Physical Properties of Nova Scotia Mine Timbers" has been carried on during the last half of the year in connection with a comprehensive investigation of Nova Scotia mine timbers, instituted by McGill University in co-operation with the Forestry Branch. Over 700 representative pit props and booms were obtained from Nova Scotia in two shipments, including five species—black spruce, red spruce, balsam fir, white birch, and yellow birch. Two hundred and fifty-one tests of these timbers in commercial sizes were carried out by March 31, in the large machines. The resistance to static bending and compression parallel to grain will throw light on the comparative strength values of available species suitable for mine purposes. Much valuable information has been obtained from these tests and the results will be ready for publication in the near future.

Plans were made to test specimens of Douglas fir in the larger commercial sizes. This work has been postponed on account of market and other conditions. A number f miscellaneous tests on various species were made during the year.

TIMBER PHYSICS.

The staff in this division includes chief, Mr. W. B. Campbell, microscopist, and photographic chemist.

Accommodation is provided in two rooms of the main building. One general laboratory is equipped with chemical desk, four sets of cabinets for filing of specimens, lantern slides, microscopic slides, etc., and tables, desks, and shelves. Another room has been partitioned for photographic work, developing and printing, the darkroom being fitted with sink, shelves, and drawers.

The equipment includes microtome, three microscopes, photographic apparatus, projection lantern, two cameras, two electric ovens, one autoclave, chemical balance, three other balances, and a variety of chemicals and miscellaneous apparatus.

The work which has been done during the year has been largely the determination of physical and structural properties of wood which has been submitted to mechanical test in the division of Timber Tests. The determinations have included moisture-content, specific gravity, per cent spring-wood, per cent summer-wood, per cent sapwood, per cent heartwood, fibre dimensions, cell structures, microscopic characteristics and fungus infection. There has been considerable study to learn the relation of microscopic structure of wood to penetration by preservatives and other liquids. General botanical studies have also been made. All the photographic work has been done by this division including the preparation of microscopic slides, photomicrographs and lantern

slides of wood sections and pulp fibres, as well as miscellaneous photographs, copies, enlargements, etc. About 1,000 measurements of fibre dimensions of Douglas fir have been made, with rather interesting results. The detection and effect of fungus infection has been an important piece of work, especially in connection with mine timbers. About 250 permanent microscopic slides have been prepared, in addition to a large number of duplicates and temporary slides. Some 325 photographs have been taken. Studies have been made to improve the methods of wood identification. A simple method has been worked out to distinguish spruce from balsam fir.

Preliminary work has been done on project No. 3, "The Relation of Vapour Pressure to Moisture Content of Wood." This investigation is designed to show the equilibrium between moisture-content of wood and humidity of the air and will be of value in connection with air seasoning, kiln-drying, cabinet-making, etc.

Card catalogue systems have been established for ready reference to slides, photographs, and specimens kept on file.

PULP AND PAPER.

The writer, chief of this division, and Mr. O. F. Bryant, assistant chief, have been on duty during the greater part of the year. The assistant chemical engineer has been absent on active military service. A paper-maker and laboratory assistant were added to the staff late in the year.

The accommodation provided for this division has already been mentioned, a separate building having been reconstructed for use as experimental mill. The large room on the ground floor measures about 90 feet by 30 feet, and accommodates most of the experimental paper machinery of semi-commercial size. A small office with space for storage of samples is also located on this floor. Two rooms are available on the second story. The front room has been fitted with skylights, benches, chemical desk, cupboards, and lockers, and will be used for experimental work on a small scale, preliminary to the work downstairs. The back room has been provided with skylights, and ventilating shaft for digesters. This room will be used for preparing cooking liquors for pulpmaking, paper size, dyes, and various materials needed for paper-mill use. The building is equipped with hot and cold water, gas, high and low pressure steam, drains, electric power and electric light.

By the end of the year the main units of semi-commercial apparatus had been installed. The special Fourdrinier paper machine is the most complete and modern equipment of its kind ever constructed. The machine is unusually flexible in its adjustments and attachments and is designed to make practically all grades of paper. A single beater of 40 pounds capacity, and a double beater of 60 pounds capacity have been installed, with interchangeable basalt lava and steel rolls with individual motor drive to each roll. The remaining equipment which is now in place includes three stuff chests, riffler, screen, three pumps, five motors, two paper testing instruments, Erfurt sizing systems, and a number of miscellaneous attachments and instruments which form the nucleus of a fairly complete semi-commercial mill.

A great deal of designing and planning has been necessary in connection with the above equipment and other apparatus which is soon to be installed. Plans have been drawn up for semi-commercial sulphite digester, semi-commercial soda and sulphate digester, liquor tanks, bleach tanks, and other equipment which will allow the manufacture of wood-pulp by chemical processes on a satisfactory scale. A variety of smaller apparatus has also been designed.

Little time has been left for actual research. Careful reviews of technical literature have been made in connection with the proposed investigation of the beating of paper pulp and the utilization of waste sulphite liquor. Arrangements were completed for the carrying on of research on the chemical composition of waste sulphite

liquor at Queen's University during the summer of 1915. A number of miscellaneous tests and minor investigations have been made during the year chiefly in connection with proposed researches.

The development of our experimental paper-mill for pulp and paper investigations under government direction has attracted rather wide publicity. Frequent assurances have been given of the support of the pulp and paper industry in Canada.

WOOD PRESERVATION.

A new division of Wood Preservation was organized in October, 1914, with Mr. W. G. Mitchell as chief, and Mr. W. Kynoch as assistant chief. The scope of this division includes the study of wood preservatives and methods of treating wood to prolong the life of ties, paving blocks, piles, posts, piling, trestle timber, mine timber, and structural timber in general. A study of wood-destroying fungi has also been undertaken, as well as methods of fireproofing wood.

The accommodation for this division is limited to an office and two laboratory rooms in the main building. One of the rooms in the basement has been provided with concrete floor, benches, tables, and piping for use as a general laboratory, while the other small room has been prepared to serve as a fungus pit.

Only a few minor pieces of apparatus were received by the end of the year. A large retort and small autoclave for impregnating wood with preservatives have been designed, together with pumps, motors, air compressors, receivers, gas boiler, and other accessories.

Before the establishment of this division, information on wood-paving blocks was collected and assembled by Mr. Mitchell for publication as Forestry Branch Bulletin No. 49, "Treated Wood-block Paving." A compilation of data on railroad ties was also made. During the year considerable attention has been paid to the reviewing of technical literature on wood preserving and the records are now fairly complete.

Returns have been received from the more important Canadian railways on consumption of treated and untreated ties and from the Canadian wood preserving plants on timber treated during 1914.

PROPOSED DIVISIONS.

Although it is not feasible to establish more than the four above-mentioned technical divisions at the present time, there are a number of other branches of work in the field of forest products which demand attention and which should be taken care of in separate divisions some time in the future. There are decided limitations to our accommodation and facilities for experimental work in the present temporary quarters, and provision for new divisions is somewhat uncertain until we have a new and fully equipped building.

A study of the lumber industry with special reference to saw-mill operations and waste wood utilization is perhaps the most pressing of these needs. Since lumber is by far the most important of our forest products, it is clear that special provision should be made for a study of this industry from beginning to end. This would involve considerable field work and a comprehensive collection of statistics and other data. The technical assistance which the laboratories might give to the industry would be partly in carrying on direct investigations, but probably more in suggesting improved methods of operation and utilization of waste. The information so collected would also furnish important data for the other divisions of the laboratories.

A division of chemistry would provide for experimental work on the recovery and refining of essential oils, turpentine, rosin, tannins, dyes, mineral residues, and

other products from the leaves, branches, bark, trunk, and roots of trees of various species. Laboratory facilities and staff for only occasional minor investigations of this kind are available at the present time.

Destructive distillation of hard and soft wood has attracted considerable attention in Canada. A certain amount of information has been collected on this subject, and a division of Wood Distillation should ultimately be organized.

The hydrolysis of wood for the production of sugars from which ethyl alcohol can be made, and the use of the wood residue as cattle food are discoveries of recent years which give promise of important industrial development in the future. At present we are unable to do any experimental work along this line.

ADVISORY COMMITTEE.

In connection with the planning of investigations and general regulation of laboratory activities, an advisory committee was appointed during the winter of 1914. The seven members, who represent a wide range of experience and interest, have been called upon from time to time during the year for advice and suggestions. The value of this co-operation has proved of great importance.

LECTURES.

At the annual meeting of the Royal Society of Canada, in June, 1914, Mr. W. B. Campbell presented a report on the work of the laboratories. In December, Mr. Campbell presented a paper to the McGill Chemistry Society on "Wood Preservation." At the December meeting of the Society of Chemical Industry in Montreal I gave an outline of the organization and investigations of the Forest Products Laboratories of Canada, and Mr. Campbell presented a paper on "Preservative Treatment of Woods." In March I gave an illustrated talk on "Wood Fibre; its Uses in Pulp- and Paper-making" before the Botanical Branch of the Ottawa Field Naturalists' Club.

In connection with the co-operation of the laboratories with McGill University, I gave a series of six lectures on the technology of pulp- and paper-making to the fourth-year chemists and chemical engineers of the university. These lectures were delivered during the months of March and April, 1915.

PUBLICATIONS.

In addition to the distribution during the year of Forestry Branch Circular No. 8, "Forest Products Laboratories," and Circular No. 9, "Chemical Methods for Utilizing Wood Wastes," manuscript was submitted in the month of July for Forestry Branch Bulletin No. 49 "Treated Wood-block Paving." A report on "Potash from Wood Ashes" and several other articles were submitted for publication in various technical journals.

INFORMATION FURNISHED.

An important function of the laboratories has been that of answering inquiries on forest products. A considerable number of letters and reports have been written to individuals and organizations giving technical information on such subjects as lumber, pulp and paper, wood preservation, wood distillation, and utilization of wood waste. Although the laboratories have been of real assistance in some cases, we have been hampered in the early stages of organization by lack of certain statistics on

Canadian conditions. In many cases our records of technology of processes is fairly complete, but the information on supply, demand, markets, and other conditions bearing on commercial feasibility are sometimes indefinite, and the advice to the public is deficient to that degree. A branch, either within the laboratories or outside the organization, for an intensive study of Canada and her forest products industries would be invaluable in linking our scientific investigations with industrial developments.

CONFERENCES.

During the summer a system of regular conferences of the technical staff was started. The idea is to have the members of the technical staff meet together for an hour once a week to hear papers on special subjects and to discuss matters of scientific interest to the laboratories. The first conference was held in July and, after a few months, it was possible to hold the meetings with more preparation and regularity. Up to the end of the year seventeen of these conferences were held, one or more papers or talks being presented in each case by members of the staff. The topics covered a wide range within the field of forest products, and were in many cases illustrated by lantern slides, diagrams, or samples. Summaries of the papers and discussions have been prepared for our library files. These conferences have been of decided value in the way of mutual instruction, stimulating the individual members in the collecting of exact information, and in training our men in expression and preparation for public lectures.

Conferences of the chiefs of divisions have also been held from time to time for the discussion of matters pertaining to the supervision of laboratory work.

TRIPS.

A number of trips have been made by various members of the staff during the year in connection with the official business. The writer attended the Forest Products Exposition in New York City in May, 1914, and visited a considerable number of government bureaus and private laboratories in Washington, New, York, Boston, and points in Canada. In connection with general supervision, Mr. Campbell spent some time at the United States Forest Products Laboratory at Madison, Wisconsin, and attended the Chicago Forest Products Exposition. Several other trips were made during the year by members of the staff for the purpose of visiting paper-mills, wood-treating plants, lumber mills, and various industrial plants turning out forest products. Among these may be mentioned a trip by the writer to a wood-distilling plant in North Carolina for the testing on a commercial scale of a shipment of resinous western yellow pine stumps from British Columbia.

These trips have caused but little loss of time from the laboratories, and have been of minor expense, while they have been of great value in bringing the laboratories in close touch with the industries and with other laboratories. Detailed reports of these trips have been placed on file in the library.

CO-OPERATION.

It is a matter of satisfaction to be able to report that the laboratories have received assurances of hearty co-operation from various industries, railways, universities, societies, and individuals. In the case of the industries, this holds particularly true of the pulp and paper companies, the wood-preserving plants, and certain of the coal companies, chiefly due to the fact that the laboratories have already undertaken

special work of interest to these industries. A number of valuable pieces of apparatus and books have been presented by firms and individuals. A number of the prominent railways in Canada have lent special aid in the investigation of the cross-tie situation. Turning to the colleges, the co-operation of McGill University has already been discussed. A system of co-operation with the other universities may be possible along the lines of the agreement already made with Queen's University, whereby laboratory facilities for chemical research have been granted in the Science building and the salary of a competent research man is paid by the Government for a definite period. The meetings of scientific societies have been attended whenever possible by members of our staff and a certain amount of active co-operation has resulted therefrom. As an example may be mentioned, the election of the writer as chairman of the recently organized Technical Section of the Canadian Pulp and Paper Association. The laboratories have been in touch with various forest branches and other public bureaus in Canada and elsewhere. The interest in the establishment of the Forest Products Laboratories has been shown in the large number of visitors who have come to see our equipment.

FUTURE NEEDS.

In recent years we have come to realize that the timber resources of Canada are not unlimited, and that as a matter of fact it will require careful methods of conservation and utilization to meet the permanent demand for forest products even within the borders of our own country. This will require education of public opinion and a more extended introduction of scientific methods into industry. The field for the Forest Products Laboratories is large and important, but the problems are in many cases difficult; for instance, utilization of sawdust, bark, tree tops, and stumps. One means at our disposal is the adapting to Canadian conditions of processes which have been worked out in other countries, while the other course is the development of new methods. While the laboratories are limited to present quarters it seems best to confine our attention to a few of the more important investigations in the divisions already established. We shall look forward to the time when enlarged facilities are provided on the basis of the proved worth of the laboratories.

Respectfully submitted,

JOHN S. BATES,
Superintendent.

PART VII

IRRIGATION

REPORT OF THE SUPERINTENDENT OF IRRIGATION.

OTTAWA, June 1, 1915.

W. W. CORY, Esq., C.M.G.,
Deputy Minister,
Department of the Interior.

SIR,—I have the honour to submit herewith the annual report of the Irrigation Branch for the year ended March 31, 1915.

In accordance with your instructions, the report has been so condensed, in comparison with previous reports, as to be merely a summary of the important work carried on during the year; as herewith submitted it consists of a summary report from the commissioner of irrigation and a brief general review of the work by myself.

The outstanding feature of the crop season of 1914, from an irrigation viewpoint, was the drought, which resulted in an almost complete crop failure in large sections of southern Alberta and southwestern Saskatchewan. The winter of 1913-14 was marked by a very light snowfall, while the precipitation during the spring and early summer was almost negligible. Much of the grain, particularly oats, did not germinate until too late to make a crop. Where proper germination did occur growth was slow, particularly on the higher land, and in some districts hot winds withered and blighted the grain before maturity.

Thousands of farmers whose all was dependent upon these crops, and whose credit was already strained to the breaking point, found themselves facing dire want, if not absolute starvation. The Provincial Governments endeavoured to meet the situation in so far as lay in their power by undertaking a large amount of road work which ordinarily would have been postponed until more urgently required. The Dominion Government undertook to provide seed grain for 1915, and also furnished provisions, forage, fuel, etc., wherever required to relieve actual distress. Several million dollars were advanced by the Dominion Government in this way.

While seasons of such extreme drought as to produce complete crop failure are comparatively rare even in the drier portions of the Canadian West, the occurrence of two such seasons within five years (1910 and 1914) forcibly illustrates several things. First, the wisdom of installing irrigation systems throughout the dry belt wherever the water supply will permit and where the land is adapted to irrigated farming. Second, the absolute necessity of improved farming methods for the conservation of soil moisture. Third, the hazardous nature of grain farming exclusively, as contrasted with mixed farming.

IRRIGATED FARMING.

Wherever water was available and was properly applied the beneficial results of irrigation were strikingly shown. Unfortunately, however, many of the smaller irrigation projects are dependent for their water supply upon small creeks which, in such a year as 1914, were usually dry, or almost so, just when irrigation was most needed. Even had reservoirs been available, which is not usually the case, the condition would not have been greatly improved, as the spring run-off was so small that only partial irrigation would have been possible even with the aid of reservoir. There are, however, several good-sized rivers within or near the dry region, and some irriga-

tion systems draw their supply of water from these streams. In these cases there was no shortage of water, but a considerable number of settlers had conceived a prejudice against irrigation and would not use the water available at their doors. In some cases such failure was due to a lack of preparation; fields were not levelled and distributing ditches were not dug, so that when the drought became acute there was not time enough to repair the neglect. Cases were noted during an inspection in August, 1914, where on one side of the road a crop was dwarfed by drought and not worth cutting, while on the opposite side a luxuriant crop was almost ready for reaping. In both cases water was available for irrigation; one man had used it, the other had not.

BETTER FARMING METHODS.

Even in districts where no irrigation systems have yet been installed there was a marked difference in the crops. Almost invariably the best crops were on ground that had been properly summer-fallowed, while the worst failures were usually fields where the seed had been disced in on stubble. In some cases inquiry showed that three crops (so-called) had been grown on one ploughing—that is, two crops disced in on stubble. Many reasons are assigned for such indifferent farming methods, and consideration must be given to some of them, particularly when it is claimed that lack of time and means make it impossible to properly prepare the land.

Here and there throughout the dry belt may be found men who practise modern scientific farming methods, sometimes called "dry-farming," and their farms, even in dry years, stand out like oases in the desert in contrast with their neighbours.

There is no conflict between irrigation and dry-farming. Both are specialized branches of agriculture, and should go hand in hand. There is far more land that requires irrigation than there is water to serve it. Much of it must be farmed without irrigation, and therefore methods must be adopted for conserving such soil moisture as is available.

MIXED FARMING.

Much has been written within the past few years of the advantages of mixed or diversified farming, and evidence is not wanting that the era of exclusive grain farming is passing away. Mixed farming, however, requires more capital than grain farming and, unfortunately, capital is hard to get just now. As settlement increases the free range gradually disappears and the large cattle ranches are broken up into farms. It has been claimed by some that this will inevitably result in fewer cattle and higher prices, but this is not necessarily true. The old ranch system of cattle raising, while well adapted to a new and sparsely settled country, was anything but economical. Immense areas of natural range were required to sustain even a small herd; little provision of hay could be made for winter use, and a hard winter usually resulted in enormous losses of stock—sometimes as high as 40 to 50 per cent of the total. With a practically unlimited free range the business was profitable, even with the inevitable losses, but the free range is gone forever, and even on the remaining ranches hay and green feed must be grown for winter use. A few more years will probably see the last of the cattle industry as we have known it, but there will not necessarily be fewer cattle. On the contrary there may easily be more stock and of a better grade.

Small farms, diversified crops, improved farming methods, irrigation where possible and necessary, a few cattle, sheep, swine, poultry and above all, alfalfa where possible, should make for prosperity. It may be a slow process, for stock costs money, good farming methods are more expensive than "grain mining," and irrigation systems also cost money; but substantial progress is being made, and the time is not far distant when the beneficial results of the system will be so apparent that it will be almost universally applied.

INSPECTIONS.

The usual inspection work was continued throughout the year, and careful inspections were made of all irrigation and water supply works either licensed or under construction. Inspections were also made to determine the feasibility of projects for which applications had been received. The increasing demand for water for domestic, municipal, and industrial purposes has necessitated a good many careful inspections to determine the existing rights, or claims to water from the streams or springs affected; and in many cases it has been found necessary to either refuse applications or to suggest other sources of supply. In the southern portions of the provinces of Alberta and Saskatchewan the smaller streams are now in many cases fully appropriated and as the demand for water increases, as it must with continued development, the question of supply will become serious. Water must then be brought from greater distances, at increased cost, or resort must be had to deep boring and expensive pumping plants.

SURVEYS.

Four large parties were employed throughout the entire field season of 1914 in further developing surveys initiated during the previous year. Three of the parties were engaged in canal location and level work in the development of the feasibility of irrigating land in southern Alberta, south and east of the city of Lethbridge, while the fourth party was engaged in completing the preliminary development of an irrigation project north of Lethbridge.

The Alberta Railway and Irrigation Company, now controlled by the Canadian Pacific Railway Company, operates an irrigation system taking water from St. Mary river in township 1, range 25, West of the 4th meridian. The land irrigable from this system is in the vicinity of Magrath, Stirling, and Lethbridge, and comprises some 170,000 acres, not all of which, however, has yet been actually irrigated. The entire district south of Lethbridge and extending eastward to the eastern boundary of the province is in the so-called dry belt and is, generally speaking, well adapted to irrigated farming. The purpose of these surveys is to fully develop the available sources of water supply, to locate possible canal routes, and to determine, in a general way, the areas commanded by such canals. The work is regarded as of great importance to the development and settlement of a very large district. It contemplates the fullest possible utilization of the available water supply from St. Mary, Milk, Belly, and Waterton rivers, including reservoirs for the conservation of flood waters, and the carriage of the water to and through the districts that can be served therefrom.

During the season of 1913 a preliminary survey was made to demonstrate the feasibility of diverting water from Belly river to St. Mary river at some point above the intake of the Alberta Railway and Irrigation Company canal. During the season of 1914 these surveys were extended with a view to developing canal routes and irrigable areas east of St. Mary river. These parties were employed, and during the season they ran 1,259 miles of level lines, 512 miles of complete traverse and level lines, 300 miles of contour surveys, developed three reservoir sites and one dam site, and set ninety-two permanent iron bench-marks. Complete reports, with plotted plans, have been submitted, but these are as yet, merely preliminary studies. It is anticipated that by the end of the season of 1915 the work will be sufficiently advanced, if not completed, to warrant a full report.

Work was continued throughout the year on the project contemplating the diversion of water from Oldman river for the irrigation of several detached tracts north of Lethbridge, comprising a total area of about 100,000 acres. The preliminary work of canal and reservoir location, and the determination of the commanded areas,

was completed during the season of 1914. Over 1,200 miles of level lines and some 200 miles of complete traverse and level lines were run.

Portions of the district comprised in this project suffered severely from drought in 1914, and the settlers have urged upon the department the completion of the surveys and the actual construction of irrigation works. Unless, however, the government is prepared to adopt a policy of construction and operation of irrigation works —and for many reasons this seems undesirable—there was until very recently no legislation under which such a project could be initiated, financed, and constructed by the persons to be directly benefited thereby. The Alberta Legislature has, however, now enacted a law known as the "Irrigation District Act," which, with possibly some slight amendments, seems to be admirably suited for this purpose. The interested persons are, it is understood, now taking steps to have an irrigation district formed under the provisions of this law, and will probably apply for a water right in the near future.

In the meantime further surveys are being made to more accurately define the irrigable lands with a view to apportioning the cost of the necessary works on the lands to be benefited. Some opposition to the scheme has developed, particularly in the western part of the district nearer the mountains, where the soil is somewhat heavier and the rainfall possibly greater. The extent of the opposition has not yet been fully developed, and it is too early to express any opinion as to whether or not it will be serious enough to jeopardize the entire project.

In the early autumn of 1914 the attention of the department was drawn to the scarcity of water for domestic use in the district lying east of Little Bow river in townships 12 and 13, ranges 18 and 19, West of the 4th meridian. It was suggested that it might be found possible to utilize the uncompleted works of the Southern Alberta Land Company for the carriage of water from Bow river, and that canals might be run from the company's main canal through the district referred to, thus supplying water for domestic and stock-watering purposes and for irrigation as well.

Surveys made during October and November, 1914, demonstrated the feasibility of diverting water from the Southern Alberta Land Company's canal so as to serve approximately 93,000 acres in townships 14 to 17, ranges 18 and 19 (70,000 acres), townships 12 and 13, ranges 18 and 19 (13,000 acres), and township 11, range 17, West of the 4th meridian (10,000 acres), and to supply water for domestic purposes during the summer season throughout the district. Unfortunately, however, the works of the Southern Alberta Land Company are not at present sufficiently advanced to permit of the carriage of water to the points at which the diversion canals must head, and the financial difficulties which have hampered the company's operations for some time past preclude the expenditure at present of the sum necessary to place the works in serviceable condition.

The surveys have, however, served a useful purpose, and when the Southern Alberta Land Company is able to complete its works so as to serve the most westerly unit of its irrigation tract, there is reasonable probability of an arrangement being made for the use of these works in the carriage of water to the district referred to. There is no question but that the district requires irrigation for its fullest development, and that the domestic water supply can be greatly improved by the construction and operation of irrigation canals.

It is understood that officers of the Geological Survey are making an examination of this and other districts in southern Alberta with a view to determining the depth at which water for domestic and other purposes can be obtained.

RESERVOIRS.

One of the most important questions that has recently engaged the attention of the engineers of this branch is the location and survey of reservoir sites for the

conservation of flood water. Several large reservoir sites were located some thirteen years ago by engineers in the employ of the Alberta Railway and Irrigation Company, and it was apparently intended that some of these sites should be used in the development of the company's irrigation system in the Lethbridge district. Only one of these, the Chin Coulee reservoir, has been constructed. Our engineers have examined several of these sites with a view to their utilization for the storage of flood water from St. Mary and Milk rivers in the development of irrigation in southern Alberta, and with special reference to the division of the waters of these streams between Canada and the United States in accordance with the provisions of the "Waterways Treaty."

Other possible reservoir sites on the headwaters of Belly and Waterton rivers have been examined in a preliminary way, and detailed surveys will be made as soon as opportunity offers.

In the Cypress Hills district—that is, the district in southwestern Saskatchewan and southeastern Alberta, between the international boundary and the main line of the Canadian Pacific Railway—there are many irrigation projects which are dependent for water supply upon streams which usually are dry, or nearly so, just when water is most needed, but which have a very considerable flow in early spring or after heavy rains. Under existing conditions, irrigated farming cannot be satisfactorily carried on. Frequently only one irrigation can be given, and that earlier than is desirable, while if the flood waters which are now wasted could be stored, a greatly increased acreage could be brought under cultivation and satisfactorily irrigated.

Our surveys have developed three large reservoir sites, viz., Cypress lake in township 6, ranges 26 and 27, West of the 3rd meridian, where it will be possible to store the flood waters of Battle creek and Frenchman river, including their upper tributaries; Middle Creek reservoir, on a tributary of Lodge creek, and a large reservoir on the lower course of Frenchman river in township 5, range 16, West of the 3rd meridian.

The Cypress Lake and Middle Creek reservoirs were fully reported upon last year. The Frenchman reservoir was surveyed during 1914. It covers 3,500 acres and can be developed to hold 50,000 acre-feet of water. These three reservoirs, supplemented by smaller ones on some of the tributary streams, will give fairly good control of the flood discharge of the streams flowing south from the Cypress hills, and provide for the irrigation of large areas of land. Their early construction is urgently required, and it is the desire of the settlers that it shall be undertaken quickly.

There are no large streams flowing north from the Cypress hills, but several small reservoir sites have been located and a few of them have been carefully examined. Possibly some additional sites may yet be discovered. A good many small irrigation projects draw their water supply from these streams, but no general policy of water conservation seems possible. Probably the problem can best be handled by the construction of small reservoirs whenever possible, and the sharing of the cost among the few whose water rights will be improved thereby. The Dominion Government may be able to assist by reserving the vacant Dominion land required for any such reservoir—and some such reservations have already been made—but as almost all the land affected is now in private ownership it will be necessary for the interested parties to deal directly with the owners and to arrange among themselves for sharing the cost of the work. This branch will be prepared to assist by placing at the disposal of the interested parties all data already collected, including plans of such surveys as have been made.

DOMESTIC WATER SUPPLY.

In some districts in the provinces of Saskatchewan where the domestic water supply problem has become acute, the Provincial Government has constructed a number of small reservoirs, or dugouts, which while not ideal sources of water supply, serve a useful purpose in providing water for stock and for the operation of farm

machinery. In cases where such reservoirs are built on well-defined streams, and where the storage of water would have an appreciable effect on the volume of water on the lower course of the stream, the government should—and usually has—acquired a water right under the provisions of the Irrigation Act. In many cases, however, such reservoirs are merely natural depressions which have been deepened to hold surface water, and there seems to be no necessity for the acquisition of water rights. The purpose of the Irrigation Act is to vest in the Dominion Government the ownership of all sources of surface water supply, with a view to the administration of the law so as to best serve the general public interest, and it is not the policy of this department to impose any unnecessary restrictions upon the conservation and use of water.

RECLASSIFICATION OF LAND ON C. P. R. IRRIGATION PROJECT.

Reference was made in my report of last year to disagreement between certain settlers and the Canadian Pacific Railway Company as to the area of irrigable land in the western section of that company's irrigation project, and which had made it necessary for this branch to undertake the reclassification of the land. This work was begun in June, 1913, and has been carried on as rapidly as possible since that time. Progress was at first necessarily slow, owing to the large amount of re-survey work, the preparation of new plans, etc., required of the company before our engineers could attempt to test the accuracy of the company's classification.

The western section comprises some 1,037,000 acres of land, of which the company's original classification showed 360,000 acres as irrigable and the remainder as non-irrigable. The classification so far completed in the field covers 270,000 acres, of which 160,000 are classed as irrigable. The net reduction in the irrigable area, according to the reclassification, amounts to upwards of 20 per cent.

There remains an area of approximately 767,000 acres, but it will not be necessary to classify all of this as the major portion is above the company's canals and in excess of the carrying capacity of the canal system. It is expected that the work will be completed during the field season of 1915.

The central section comprises a total area of 833,231 acres, but the company does not propose to proceed with the irrigation of this area at the present time.

The works for the eastern section, however, have been constructed and the classification has been approved for practically all the western half of the tract. The entire tract comprises 1,245,731 acres, of which the company estimated 440,000 acres as irrigable, but it is expected that the actual irrigable area will not exceed 420,000 acres, of which nearly 200,000 acres have already been classified. After deducting all quarter-sections entirely non-irrigable, the approximate percentage of irrigable land has been estimated as 76·7 per cent, as compared with 60 per cent in the western section.

ANALYSIS OF SOIL.

In connection with the classification of land to determine the irrigable area it has been found necessary to make a close study of the climatic and soil conditions within the tract, as it has been asserted that these conditions preclude the successful practice of irrigated farming.

Arrangements have been made with the Department of Agriculture whereby the soil samples collected in the field by engineers of this branch have been submitted to Dr. F. T. Shutt, Dominion Chemist, for analysis in the chemical laboratory at the Central Experimental Farm at Ottawa. The work has so increased in volume that Dr. Shutt found some time ago that he could not handle it satisfactorily with the staff at his disposal, and arrangements were therefore made for the employment of two assistant chemists selected by Dr. Shutt and working under his supervision but paid by this department. Great difficulty has been experienced in securing and retaining the services of competent men for this work, and this has caused a great deal of regrettable but unavoidable delay.

Some 166 groups of soil samples have been submitted for analysis, each group comprising from three to six samples, taken at varying depths on the same location. Of these, 51 groups have been analysed and reported upon; partial or interim reports have been made in 47 cases, while the remainder are now under way or awaiting action. The process is necessarily tedious and the work cannot be hurried.

The primary purpose for which these soil analyses are being made is to determine the amount of alkali or other injurious substances in the soil. It is obviously impracticable to analyse samples from each quarter-section or smaller tract of land comprised in the survey; this would unduly delay the work of classification and, speaking generally, would serve no useful purpose. The field engineers use their discretion in determining where samples shall be taken, taking into consideration the surface indications of alkali, the natural drainage, the results of analyses of soil from the same vicinity, etc.

With a view to reducing to a minimum the quantity of analytical work required, an electrical bridge has been obtained for use in the field in determining the soluble salts in a soil by indicating the electrical resistance of a saturated sample corrected according to the temperature. Experiments on clays and soils of which the alkali contents were known gave the following results:—

Less than 80 ohms—very strong alkali.
Less than 130 ohms—strong alkali.
Above 190 ohms—weak alkali.
Above 400 ohms—negligible.

The presence of organic matter, or of carbonates, and the fineness of texture affect the resistance for a given content of alkali, and the use of the bridge is subject to certain limitations, but in actual practice it is usually found possible to obtain definite results, and over 100 samples have already been conclusively tested by our engineers in the field, resulting in a great saving of time and expense, as, unless the electrical bridge had been used it would have been necessary in all these cases to submit samples to Ottawa for analysis.

CLIMATIC CONDITIONS.

A careful study has been made of the climatic conditions in the western section of the Canadian Pacific Railway Company's irrigation tract with a view to determining the truth or falsity of the charges so persistently made that they are unsuited to successful irrigated farming. The inquiry included in its scope the cropping season, or that period between the last killing frost in the spring and the first killing frost in the autumn, the period necessary for the maturing of crops, the incidence of local frosts and the necessity for irrigation in the district. The conclusion reached is that the climatic conditions in this section are not essentially different from those in several other places where irrigation has been successfully practised for many years, and therefore that there is no reason, so far as the effect of climate is concerned, why it should not be successful there; that irrigation is very desirable in this section, particularly for the cultivation of alfalfa, and that should there be another dry cycle such as occurred from 1885 to 1896, irrigation would be an absolute necessity. If opportunity offers the data collected in connection with this inquiry will be published in pamphlet form for distribution among those interested in the subject.

Incidental to study of the climatic conditions, records have been made of the temperature of the water in the irrigation canals throughout this section. It has been alleged that the application of cold water from a mountain stream like Bow river chills the soil and retards plant growth. The result of these investigations does not support the charge.

SOUTHERN ALBERTA LAND COMPANY.

Reference was made in the report for 1913 to the financial and other difficulties, which were then seriously hampering the company in its construction work. The government had agreed to advance to the company a sum of money which together with a further sum which the company undertook to raise, was estimated as ample to complete the works to an extent sufficient to permit of the sale of land and water rights on a portion of the system and to ensure the gradual extension of the works from the proceeds of the sale of land on the portion first completed and placed on the market.

An agreement was executed on the 31st July, 1914, between the receiver of the company and the government, whereby the government agreed to advance the sum of $354,684, taking as security a first mortgage on some 30,000 acres of land owned by the company. The company undertook to raise an additional sum of $800,000, and these sums were to have been expended in the completion of the company's irrigation system, all expenditures being made under government supervision, and accounts thereof being furnished to the government from time to time.

At the time of the execution of this agreement, satisfactory evidence had been furnished by the receiver to a representative of the government of the company's ability to raise the sum of $800,000 and it is understood that arrangements for the loan were well advanced at that time. The outbreak of war early in August, 1914, made it impossible for the company to raise any further funds, and as soon as this became apparent to the receiver he gave instructions for the closing down of all construction work and for carrying on only such work as might be found necessary for the protection of the uncompleted works, stores and material, and the company's assets generally. Work was accordingly closed down in the latter part of August, 1914, and the staff was discharged, with the exception of the chief engineer, who is the company's general manager in Canada, a few men who have been retained to act as watchmen or caretakers on the works and storehouses and a very small office staff.

The sum of $240,000 has been advanced to the company under the provisions of the agreement of July 31, 1914, and practically all of this has been expended. Work cannot be resumed unless further funds are raised. In the meantime a considerable annual expenditure will be required to maintain the existing organization, for the protection of the plant and to pay local and other taxes. Even if funds for this purpose can be provided the uncompleted works will steadily deteriorate, particularly the wooden structures. It is understood that the receiver is endeavouring to raise funds sufficient to complete the works from the intake to the westerly boundary of the tract to be irrigated, with a view to the sale of land and water rights on a tract of some 21,000 acres in the westerly part of the tract. If this can be done the company will again become a going concern, and the sale and successful irrigation even of this small area should be of great benefit in demonstrating the value of irrigation in this district and should thus materially assist in the disposal of the remaining lands when the works can be extended to serve them.

WATERWAYS TREATY.

The treaty between the United States and Great Britain, relating to boundary waters and questions arising between the United States and Canada, commonly referred to as the "Waterways Treaty," provides, *inter alia*, for the equal apportionment of the waters of St. Mary and Milk rivers and their tributaries (in the State of Montana and the provinces of Alberta and Saskatchewan) between Canada and the United States; also that the measurement and apportionment of the water to be used by each country shall from time to time be made jointly by the properly constituted reclamation officers of the United States and the properly constituted

irrigation officers of His Majesty under the direction of the International Joint Commission, which the High Contracting parties agreed to establish and maintain for the purpose of administering the treaty. The treaty was signed on January 11, 1909, and ratifications were exchanged at Washington on May 5, 1910.

In order to determine the flowage of the streams comprised in the treaty, numerous gauging stations were established by the respective countries within their own territory and, by agreement between them, four joint, or international stations were established, one on St. Mary river and three on Milk river. The expense of establishing and maintaining these international stations is borne by the respective countries jointly, and the records are available to both. Aside from this, each country maintains and operates the stations within its own territory and records of stream flow are exchanged from time to time. These measurements, while not made under the direction of the International Joint Commission, were made by the proper officers of the respective countries and with a view to furnishing such information as will be required by the Commission when necessity arises for apportioning the water.

During the summer of 1914 the commission delegated two of its members to visit the West for the purpose of familiarizing themselves with the situation. They were accompanied on their trip of inspection by Mr. F. H. Peters, Commissioner of Irrigation, who endeavoured to explain the local situation in Canada as fully as possible. A report was submitted by the sub-committee to the commission recommending a hearing of the case for the purpose of considering the method to be adopted for the measurement and apportionment of the water and for the further purpose of hearing the views of the interested parties as to how this may best be accomplished.

The officers of this branch were engaged for several months in assembling data and preparing a case for submission to the commission, based upon careful studies of the physical and other conditions which have been carried on for several years. Particular credit is due to Mr. R. J. Burley, who has been for the past two years engaged on this case and whose careful and thorough work is deserving of recognition. At the request of the officers of the Reclamation Service, and with the approval of the commission, a preliminary conference was held at Washington in April last, between certain of our officers and those of the Reclamation Service, for the purpose of discussing and comparing stream flow and other data which were being prepared for submission to the commission.

The case was heard by the commission at St. Paul, Minnesota, on the 24th May, 1915, and following days, and decision was reserved. The Canadian Government was represented by: C. S. MacInnes, K.C.; W. J. Stewart, Chief Hydrographer, Department of Naval Service: E. F. Drake, Superintendent of Irrigation; F. H. Peters, Commissioner of Irrigation; and R. J. Burley and J. A. Spreckley, irrigation engineers. There were also present: John Stocks, Deputy Minister of Public Works, Alberta; J. D. Hunt, counsel for the province of Alberta; A. F. Mantle, Deputy Minister of Agriculture, Saskatchewan; William Pearce, representing the Western Canada Irrigation Association; R. J. Burley, representing the Cypress Hills Water Users' Association; and, representing the Canadian Pacific Railway Company, J. S. Dennis, Assistant to the President; G. A. Walker and M. S. Gunn, counsel. The United States was represented by counsel and by several officials of the Reclamation Service. The state of Montana, the Water Users' Associations of the Upper and Lower Milk River valley, and the Great Northern Railway Company were also represented.

While it would be improper to attempt to forecast the findings of the commission, it is gratifying to know that the various Canadian interests were in complete accord and had agreed that the entire case might be presented by the Dominion authorities, and, although a complicated series of technical questions is involved, it seems probable that a practical solution may be evolved to fairly meet the conflicting interests of the two countries.

In preparing the case for Canada a very extensive use was made of records of stream measurements on the St. Mary and Milk rivers and their tributaries, and the valuable information so obtained amply justifies the policy adopted since 1908 of conducting a continuous and systematic hydrometric survey of the streams in Alberta and Saskatchewan and publishing the results annually for the use of private interests as well as the various government branches concerned with the development of the western provinces.

DUTY OF WATER AND DEMONSTRATION WORK.

A very important feature of irrigation administration is the determination of the quantity of water required to produce the most beneficial results when applied for irrigation. The existing regulations define the "duty of water," or the ratio between a given quantity of water and the area of land it will irrigate, as 150 acres for each cubic foot of water per second flowing constantly throughout the irrigation season of 153 days. This quantity is equivalent to about two acre-feet of water for each acre of land irrigated, or enough to cover each acre to a depth of two feet. The best modern practice inclines towards expressing the duty of water in depth over the irrigated tract, rather than by the rate of flow, and in the revised regulations now in course of preparation the duty is defined as two acre-feet per acre, an acre-foot being equivalent to 43,560 cubic feet.

This depth may be, and probably is, too great. The duty was established some fifteen years ago and was based upon experimental work carried on principally in the Western United States. Experience has shown that there has been a general tendency on the part of irrigators to use too much water, and that the result in many cases has been to sour and waterlog the land, or to cause the rise of alkali to such an extent as to temporarily ruin the soil. Some experimental work was done in Canada several years ago, and in 1913 it was taken up in a systematic manner with a view to determining the quantity of water required to produce the most beneficial results for different crops under the varying conditions of soil and climate in the dry belt of Western Canada.

Mr. G. D. Walters, an agricultural engineer of considerable experience in this line of work, was placed in charge. During the season of 1913 he conducted some experiments in the vicinity of Lethbridge but was unable to do much more than get the work properly started. In 1914 Mr. Walters conducted a series of experiments on small plots of grain of various kinds, vegetables, and alfalfa at Strathmore, Alberta. The results, while demonstrating the value of irrigation in greatly increased yields, were by no means conclusive in fixing the proper duty of water, and a good deal of further experimental work will be required before any definite conclusions can be reached. The experiments are being continued at Strathmore, Lethbridge, Gleichen, and Ronalane, Alberta, during 1915, and a full report will be submitted when the work is sufficiently far advanced to warrant it.

Owing to some unfortunate difficulties which developed several years ago between the Canadian Pacific Railway Company and settlers on its irrigation tract, very little intelligent irrigation farming has been carried on in that tract. Some of the settlers had become prejudiced against irrigation, while others who were willing to practise it knew so little about it that their efforts were not as successful as they should have been. With a view to demonstrating the value of irrigation when intelligently practised, Mr. Walters and his assistants have placed their services at the disposal of the settlers. Any farmer who wishes may thus secure expert advice and practical assistance in preparing his land, constructing his distributing ditches, and applying water to his crops. The only conditions we make are that the farmers shall agree to follow the instructions of our officers and permit them to supervise the work of irrigating the crops, measuring the quantity of water applied and the yield secured. Quite a

number of the more progressive farmers have taken advantage of this offer, and the results thus far obtained have been very gratifying. Irrigation farming is not the simple process of turning water onto a field and reaping a bountiful harvest, as many seem to imagine; it is a highly specialized form of agriculture, and agriculture itself—aside from irrigation—is a science, notwithstanding the too common belief that any one can be a farmer even though he may have failed signally in other lines of endeavour.

It is confidently believed that the demonstration work now being carried on by the officers of this branch, supplemented by similar work done at the Dominion Experimental Station at Lethbridge, and by the Canadian Pacific Railway Company and the Southern Alberta Land Company, will prove of great value in the development of the irrigable areas of the West. The Dominion Department of Agriculture is now undertaking similar work on dry farms with a view to demonstrating the value of good farming methods in producing increased yields of crop, and it will be interesting to compare the results on the dry and the irrigated farms in the same localities when both have been properly farmed under expert advice and supervision.

DRAINAGE INVESTIGATIONS.

Several large drainage projects and a considerable number of smaller ones have been investigated by our officers during the past year. Many applications have been received for the purchase of large areas of land for reclamation by drainage. In most cases drainage is feasible and necessary for the proper development of the land, but many of the tracts applied for are remote from settled areas, and there appears to be no necessity for their reclamation at present when large areas of good agricultural land that do not require drainage remain unoccupied and uncultivated. In some cases the applications for large tracts of land, or for the drainage and reclamation of large lakes, appear to be of a speculative nature and not deserving of favourable consideration.

Some of the applications, however, cover tracts of marshy or submerged land in well settled districts, and the reclamation of such land is clearly in the public interest. The drainage of such lands is often absolutely necessary in order that roads may be constructed giving direct and easy access to railways and markets. Several such projects are now under consideration, but the financial stringency will probably prevent the investment of the capital required for their construction for some time to come. Most of the applications so far dealt with have been for the drainage of small lakes or marshes which affect only a few hundred acres, usually forming part of quarter-sections acquired by settlers under the homestead or pre-emption regulations. The policy of the department has been to encourage such drainage projects to the fullest possible extent.

INTERNATIONAL IRRIGATION CONGRESS.

In October, 1914, the first session of the International Irrigation Congress ever held beyond the boundaries of the United States was held at Calgary, Alberta. There was a large attendance of delegates from the Western United States and from the provinces of Alberta, Saskatchewan, and British Columbia. The proceedings were interesting, and the addresses and discussions more than usually practical. A soil products exhibition was held in conjunction with the Congress, and in the same building. Valuable prizes were offered, and the exhibits were numerous and of a high order of merit. The exhibits were not limited to the products of irrigated farms and orchards, and thousands of visitors who were not directly interested in the proceedings of the Congress availed themselves of the opportunity to visit the exhibition and to inform themselves of the agricultural possibilities of the western provinces.

STREAM MEASUREMENT.

The work of stream measurement has been carried on as in former years and extended to many streams which for various reasons could not conveniently be previously reached. A full report of this important branch of the work will be published under the title of "Report of Progress of Stream Measurements" as soon as the data covering the year's work can be collated.

STAFF OF BRANCH.

The staff of the branch has from time to time been increased to meet the growing demands of the work and now numbers:—

Ottawa Office—permanent	12	
" " —temporary	8	
Calgary Office staff	24	
" Field staff	49	
" Temporary field staff (summer)	76	
	—	169

A good many changes have been made in the personnel of the staff during the past year, chiefly owing to the fact that several of our officers have been accepted for active service. In most of these cases it has been found necessary to employ temporary assitance to replace the absent officers, although this has not been done in all cases. Although several of our officers are now on active service with the First Canadian Contingent, I am glad to be able to say that no deaths have yet been reported and, so far as I am aware, only one of these officers has been reported wounded. The disorganization of the staff due to these numerous changes has thrown a great deal of extra work upon the remainder, and during the past winter it became necessary to cancel all annual leave in order that the work might be kept up. The members of the staff have accepted the situation without complaint and have done all in their power to ensure that the office and field work was kept up to date. The names of the officers of this branch who have so far been accepted for active service are:—

D. C. McDougall,
C. V. Craik,
W. E. Dow,
E. S. McMillan,
C. B. Hornby,
H. D. St. A. Smith,
E. S. Clifford,
G. H. Nettleton,
H. S. Kerby,
J. H. Jones,
E. W. Hughes.

Several others have volunteered but have not yet actually enlisted.

REVENUE.

Appended hereto is a statement of the revenue received and accounted for by this branch during the year ended the 31st March, 1915. Owing to the crop failure in the district in which most of the irrigation sales of land have been made, many

extensions of time have been granted and the payments made on account of such sales are considerably less in amount than in the preceding year.

Lethbridge Agency	$ 535.50
Calgary Agency	1,592.75
Medicine Hat Agency	1,394.34
Swift Current Agency	227.40
Maple Creek Agency	1,875.90
Irrigation Office, Calgary	679.00
Total	$6,304.89

Your obedient servant,

E. F. DRAKE,
Superintendent of Irrigation.

SUMMARY REPORT ON IRRIGATION AND CANADIAN IRRIGATION SURVEYS.

By F. H. Peters, *Commissioner of Irrigation and Chief Engineer.*

Ottawa, April 12, 1915.

E. F. Drake, Esq.,
Superintendent of Irrigation,
Department of the Interior,
Ottawa.

Sir,—In accordance with your instructions I beg to submit herewith a concise report on all the work which was carried out under my charge during the year 1914-1915.

In order to conform to your instructions regarding brevity this report will be confined to a very short description of each feature of the work as it was carried out.

ORGANIZATION OF STAFF.

The organization of the staff was similar to the previous year. The staff has two main divisions in the permanent office staff and the permanent field staff which is augmented each summer by subordinate assistants for carrying out the field work. The total number of persons employed on the permanent office staff was twenty-four, and on the permanent field staff thirty-four. On the special Canadian Pacific Railway Western Section re-classification, the field and office staff numbered fifteen persons. The additional number of persons employed temporarily during the summer was seventy-six. This gives a grand total of permanent officers of seventy-three and, including summer assistants, one hundred and forty-nine.

OFFICE WORK.

The office work carried out is indicated by the schedule below which is given in a similar form to previous years for purposes of comparison.

Letters received	13,827
Letters sent out	22,534
Applications for water rights recorded	57
Plans examined and filed	264
Agreements, right of way, etc., recorded	37
Right-of-way plans recorded in quadruplicate	45
Water agreements filed in quadruplicate	49
Water agreements cancelled	76
Water agreements transferred	32
Notices for publication prepared	49
Plans prepared	721
Blue prints made	15,000
Certificates issued under section 20	55
Certificates issued under section 33	62
Licenses recorded in triplicate	53
Weekly reports received from engineers	2,273
Reports of discharge masurements received	3,450
Reports of gauge heights received	6,900
Descriptions of regular gauging statons, H. 1	60
Reports of changes at river station, H. 22	200

FIELD WORK.

The field work which was carried out is indicated below, subdivided under the headings of the field parties which carried out the work.

Eastern Cypress Hills District—Irrigation Inspections.—This work was confined to the same district as in the previous year, and was efficiently carried out by Mr. M. H. French, the engineer in charge. The party took the field on May 1, 1914, and finally disbanded on October 30, 1914, thus completing a working season of 157 days. The total number of schemes inspected was ninety-six, the number of schemes surveyed was five, and the number of miles travelled by team was 2,016. In addition to this routine work, Mr. French completed the survey of a reservoir site on the Frenchman river, the impounding dam for which is located in sections 23 and 24, township 5, range 16, West 3rd meridian. This work comprised the running of twenty miles of traverse lines. The elements of the reservoir are as follows: Capacity, 80,000 ac.-feet; maximum height of dam, 63 feet; flooded area, 2,991 acres; drainage area, 1,106 square miles; assumed run-off, 50,000 ac.-feet. The party consisted of six men with seven horses.

Western Cypres Hills District—Irrigation Inspections.—This work was confined to the same district as in the previous year, and was efficiently carried out by Mr. H. R. Carscallen, the engineer in charge. The party took the field on May 1, 1914, and finally disbanded on December 14, 1914, thus completing a working season of 176 days. The total number of schemes inspected was 119, the number of schemes surveyed was 17, and the number of miles travelled by team was 3,932. The party consisted of six men, with eight horses.

Calgary District—Irrigation Inspections.—The work was confined to the same district as in the previous year, and was efficiently carried out by Mr. R. H. Goodchild, the engineer in charge. The party took the field on April 28, 1914, and finally disbanded on November 19, 1914, thus completing a working season of 177 days. The total number of schemes inspected was 128 the number of schemes surveyed was 5, and the number of miles travelled by team was 1,648. Mr. Goodchild had one assistant and used one team of horses.

Special Inspections—Domestic, Municipal, Irrigation and Industrial.—The work of special inspections was carried on in a similar manner to the previous year by Mr. C. Chambers and Mr. F. R. Burfield, with the assistance for a short time of Mr. A. W. P. Lowrie in order to complete the season's work.

Mr. Chambers carried out the bulk of the routine work, and made a total of seventy-one inspections, preparing twelve plans, and travelling 9,560 miles by train, 2,240 miles by democrat.

Mr. Burfield spent about six weeks in investigating drainage conditions in the Quill Lakes district, running 27 miles of levels, and later made a trip extending over four weeks and covering 495 miles, mainly with a pack-horse outfit, inspecting a number of drainage schemes in the district lying between Lesser Slave lake and Grande Prairie. His work comprised the inspection of forty-three schemes, the preparation of eight plans, and the travel of 8,339 miles by train.

The work done by Mr. Lowrie comprised the inspection of thirteen schemes, the preparation of one plan, and the travel of 1,125 miles by train.

Large Irrigation Companies—Progress Reports.—Mr. S. G. Porter again devoted his time to a special supervision of the large irrigation companies and, in addition, had under his special charge the approval of the classification of the Canadian Pacific Railway Company's eastern section irrigation block.

During the early part of the year the financial difficulties encountered by the Southern Alberta Land Company caused some special investigation to be necessary, and Mr. Porter submitted a special report detailing the physical assets of the company and estimating the sum of money required to complete the project. A report was submitted on the Alberta Railway and Irrigation Company's project at Lethbridge. The greater part of Mr. Porter's time was devoted to the C.P.R. eastern section classification.

Classification of Irrigable Land—C.P.R. Eastern Section.—One field party was operated on this work under the charge of Mr. J. S. Tempest, who had as his assistant Mr. P. A. Fetterly. The party took the field on May 5, 1914, and finally disbanded on November 21, 1914, thus completing a working season of 171 days. During the season the classification covering thirty-three townships was checked in the field. The approved classification for eleven townships was submitted to the C.P.R. Company, and the approved classification for the remaining twenty-two townships was submitted to Ottawa. The party consisted of six men, with six horses.

Reclassification of Irrigable Land—C.P.R. Western Section.—The reclassification of irrigable land in the C.P.R. western section was continued under the charge of Mr. G. H. Houston, who had as his chief assistant Mr. R. C. Spitzer. One large field party was employed on this work, which took the field on March 18 and finally disbanded on December 5, 1914, thus completing a working season of 227 days. In addition to the field party, eleven assistant engineers were employed on this work in the office. During the season practically all of the sold land was reclassified in the field except the districts of Keoma and Langdon, and also about 37,000 acres of unsold land, A summary of the season's reclassification is as follows: irrigable acres, 133,392; non-irrigable acres, 106,387; right of way, 4,660 acres; total, 244,439 acres. Including the smaller amount of work done during 1913 the figures are as follows: irrigable acres, 169,898; non-irrigable acres, 124,638; right of way, 5,282 acres; total, 299,818 acres.

During the winter months, Mr. Houston submitted special reports with reference to the western section on "The temperature of water in the canals," "Absorption losses in canals,' 'and "General climatological conditions." The field party consisted of nineteen men, with nine horses and one automobile.

Irrigation Surveys.—Very important irrigation surveys were carried out during the year under the supervision of Mr. B. Russell, Chief Field Inspector. The work was developed by four field parties as indicated hereunder.

Milk and St. Mary Rivers—Irrigation Project.—Party No. 1, under the charge of Mr. T. M. Montague, with Mr. L. J. Gleeson as assistant, was employed in locating canals and reservoirs to develop the possibilities of diverting and conserving irrigation water from the St. Mary river and the Milk river to water an additional tract of about 381,000 acres of irrigable land lying to the east of the present Alberta Railway and Irrigation Company project and between the Crowsnest branch of the Canadian Pacific Railway and the Milk river. This party took the field on May 12, 1914, and disbanded on October 12, 1914, completing a working season of 131 days. During the field season the party ran 302 miles of complete traverse and level lines, surveyed three reservoir sites, including 300 miles of contour survey, developed one complete dam site, and set twelve permanent iron bench-marks. During the winter months a complete report, with plotted plans, was prepared. The party consisted of thirteen men, with nine horses.

Party No. 2 under the charge of Mr. N. M. Sutherland, with Mr. W. Jackson as assistant, was employed projecting a system of levels along all the township lines in the district indicated under Party No. 1 in order to develop the irrigable areas that could be commanded. About half the area to be studied was assigned to this party, and when the levelling operations had been completed the party extended the work being done by party No. 1 by picking up their work and projecting the main irrigating canals through the irrigable land. This party took the field on May 9, 1914, and continued at this work until September 26, when it was transferred to other work. A working period of 120 days was put in on this work, during which time the party ran 644 miles of level lines, setting 35 permanent iron bench-marks and, in addition, ran 138·7 miles of complete traverse and level lines.

On September 26, 1914, the party was transferred to work in the district lying between the Little Bow river and the Southern Alberta Land Company's tract, and here carried out very similar work in developing the northern part of what has been termed the Sundial Irrigation Project. This work was completed and the party disbanded on November 26, putting in a period of sixty-one days on this work, and running 381 miles of level lines, setting 22 permanent iron bench-marks, and running 47·3 miles of complete traverse lines on canal location. The total working season of this party was 193 days. During the winter months a complete report, with plotted plans, was prepared. The party consisted of eleven men, with six horses.

Party No. 3, under the charge of Mr. A. W. P. Lowrie, with Mr. H. D. St. A. Smith as assistant, was employed on similar work to party No. 2 on the Milk and St. Mary rivers' project developing the remaining half of the irrigable area. This party took the field on May 11, 1914, and disbanded on September 26, 1914, completing a working season of 121 days. During the season the party ran 615 miles of level lines, set 45 permanent iron bench-marks, and ran 72 miles of complete traverse and level lines on canal location. During the winter months a complete report, with plotted plans, was prepared. The party consisted of eleven men, with six horses..

This party was disbanded before the close of the usual working season, and Mr. Lowrie, after spending a few days at Calgary, was employed during the latter part of the season on the work of special inspection.

The Oldman River Irrigation Project.—The work on this project was commenced in 1913, and during the past season all the necessary preliminary development work was completed. The field party was under the charge of Mr. V. Meek, with the late Mr. P. J. Stewart as assistant. The work, as fully described in the report submitted for 1913, was carried on by completing the actual location of the secondary canals, and running levels over all section lines so that the commanded area has been accurately defined and the actual irrigable area can be closely estimated. This party took the field on May 9, and completed this work on October 17, when it was transferred

to other work. A working period of 139 days was put in on this work, during which time the party ran 212 miles of complete traverse and level lines on canal location, and ran 1,212 miles of level lines, setting 1 permanent iron bench-mark.

On October 17 the party was transferred to work on the southern part of the Sundial Irrigation Project and carried on very similar work to that indicated under party No. 2. This work was completed and the party disbanded on November 20, putting in a period of twenty-nine days on this work, running thirty-three miles of level lines and 63 miles of complete traverse and level lines on canal location. The total working season of this party was 168 days. During the winter months a complete report, with plotted plans, was prepared. The party consisted of twelve men with six horses.

International Waterways Treaty.—Mr. R. J. Burley again had charge of the special investigations in connection with this work, which was again prosecuted with a view to obtaining and filing all information necessary to gain a complete understanding of all the problems involved under those articles of the treaty concerning the division of the waters of the Milk and St. Mary rivers. During the field season, Mr. Burley carried on a reconnaissance in the field, gaining information of the physical conditions existing in the watersheds of these two rivers. During the winter months Mr. Burley, with some office assistance, completed a report accompanied by maps and schedules dealing completely with this whole question.

All of the information gained by the field parties as detailed under the Milk and St. Mary rivers has a direct bearing on this case, and the information thus made available has been used in Mr. Burley's report.

A reconnaissance was also made in the field by the commissioner and Mr. B. Russell on the headwaters of the Belly river and the Waterton river with a view to the location of conservation reservoirs on these rivers for irrigation water, to be used as additional supply for the irrigable land described under the Milk and St. Mary rivers' investigation.

During the summer two members of the International Joint Commission, Messrs. H. A. Powell, representing Canada, and Senator O. Gardiner, representing the United States, made an inspection trip in Alberta, and the commissioner accompanied these gentlemen through the Lethbridge district and the upper valley of the St. Mary river.

Duty of Water Experiments and Demonstration.—This work was somewhat extended during the year under the supervision of Mr. G. D. Walters, who had direct charge at Strathmore in the C.P.R. western irrigation block of the dual work of conducting a series of special duty of water experiments and demonstrations and also conducting demonstration work on the irrigated farms in the close vicinity of Strathmore.

Mr. W. H. Snelson had charge of the work in the Coaldale district of the Alberta Railway and Irrigation Company's project at Lethbridge, and his work was devoted to measuring the actual quantities of water applied to the irrigated fields in this district, gaining all information possible with a view to demonstrating what is the proper and most beneficial duty of water.

Through the courtesy and co-operation of the Southern Alberta Land Company, some very useful data were also compiled covering the use of water on their irrigated demonstration farm at Ronalane near Medicine Hat.

The brevity of this report will not allow of any lengthy discussion of this all-important matter, but it may be said in short that the data which have been compiled are most encouraging and satisfactory as indicating the great gains to agriculture that can be realized by the proper application of irrigation water to a wide variety of crops.

Absorption Losses in Irrigation Canals.—A question which has received too little attention in the past is that one dealing with the inevitable losses which occur on every canal system in conducting the water from the source of supply to the farmer's headgates, due to seepage and evaporation in the main, secondary, and tertiary canals. During the irrigation season one hydrometric engineer, Mr. R. J. McGuinness, was employed in making measurements with a view to determining these losses in the canals of the C.P.R. western section and the Alberta Railway and Irrigation system at Lethbridge. The work is very complicated owing to many practical difficulties which arise in the field, but during the season data were gained which, while not entirely satisfactory, have made it possible to determine the average "absorption" losses between certain limits.

Hydrometric Surveys.—This work, covering the measurement of the flow in all the important streams in Alberta and Saskatchewan, has a very wide scope and it is only possible in this summary report to indicate the work that has been carried out. The results of the work in detail will be published in a separate report on Stream Measurements.

The work was carried out under the charge of Mr. P. M. Sauder, Chief Hydrometric engineer, with two principal assistants, Mr. G. H. Whyte and Mr. G. R. Elliott. The office staff consisted of two office computers and recorders, and twelve hydrometric engineers were employed in the field.

The districts covered were the same as described in the previous year's report, with the addition of the Wood Mountain district, which comprises a number of streams which rise in Saskatchewan and flow across the international boundary, and are of considerable importance for this reason. During the season records were gained for 164 permanent gauging stations, 3,550 stream measurements were made by the field engineers, 29 new permanent stations were established, and 24 permanent iron benchmarks were set.

On many of the smaller irrigation streams in Saskatchewan and Western Alberta a very high percentage of the run-off takes place in the early spring due to the melting and rapid run-off of the winter's snow. Previously the hydrometric engineers had not taken the field early enough in the spring to measure this flow, but during the spring of this year a special effort was made to obtain these very important measurements. In order to handle this work, eight hydrometric engineers took the field early in March and gained very valuable measurements. Six engineers were placed in the Cypress Hills district, one north and four south of the hills, another operated along the line of the Canadian Pacific Railway between Medicine Hat and Maple Creek. The hydrometric engineer in the Wood Mountain district took the field as early as possible, but owing to the difficulties of getting into this district did not get the peak measurements on all of the streams.

Current Meter Rating Station at Calgary.—The rating station was operated during all of the open-water season, and a total of seventy-five current-meters were rated as below:—

Irrigation Office	41
British Columbia Hydrographic Survey	11
British Columbia Government	5
Manitoba Hydrographic Survey	12
Department of Public Works Canada	4
Canadian Pacific Railway	2
	75

I have the honour to be, sir,
Your obedient servant,

F. H. PETERS.

PART VIII

WATER POWER

DOMINION WATER POWER BRANCH

Ottawa, July 15, 1915.

W. W. Cory, Esq., C.M.G.,
Deputy Minister of the Interior,
Ottawa.

Sir,—I have the honour to submit the following report concerning the Dominion Water Power Branch for the fiscal year ending March 31, 1915, together with the attached reports of the engineers in charge of divisions.

The commodious quarters in the Union Bank building which have been occupied by the branch during the early part of the last fiscal year have already become inadequate, and it is urgently necessary that additional space be obtained.

Satisfactory progress has been made in all the work of the branch both at head office and in the various permanent offices throughout the Dominion. Some rearrangements in the personnel and organization of the head-office staff has already afforded a marked improvement in the work. Particular mention should be made of the transfer from the Topographical Surveys Branch of W. E. Weld, D.L.S., and from the office of the private secretary to the minister, Mr. Stanley Forbes. Mr. H. E. M. Kensit, electro-mechanical engineer of the Branch, who resigned some time ago to accept a prominent position in a municipal management in western Canada, has again joined the staff. Mr. Kensit's outstanding ability in his particular branch of engineering investigation renders his connection with the branch, at this stage, unusually desirable. All the field work carried on under the direction of the Chief Hydraulic Engineer, Mr. J. T. Johnston, has made steady substantial progress. The hydraulic and hydrographic surveys in the provinces of Manitoba and British Columbia have been gradually extended and developed to a degree commensurate with the funds available for the work. A full report on the power and storage investigations of the Bow river by Mr. M. C. Hendry has been published and extensively distributed. This report forms a notable addition to the information respecting water-power resources of Canada, and should prove invaluable to the department in working out an efficient and effective administration of the important water-powers of the Bow river, which already forms such an important factor in the commercial power and storage investigations of the Winnipeg river is now about ready for the King's Printer, and should be issued early in the coming fiscal year. These reports not only set out the exceedingly advantageous water-power resources of the Bow and Winnipeg rivers, but afford the department all the physical information necessary to enable a comprehensive control scheme being worked out in order that a permanent policy of water administration may be arrived at which will ultimately realize the maximum possible advantageous use of the water resources for water-power and other purposes.

Several distinguished visitors from foreign countries have spent considerable time with the engineers of the branch studying our methods of water-power administration and investigation. Among these visitors may be mentioned: Mr. Von Weymarn, C.E., of the Imperial Russian Government; Mr. A. Berggren, Superintendent of Government Power Stations, Sweden; and Mr. Richard Smedburg, of the Hydrographic Bureau, Sweden.

The branch has co-operated extensively with the Commission of Conservation, the Comptroller of Water Rights for the province of British Columbia, the Public Utility

Commissioner of the province of Manitoba, the Commissioner of Dominion Parks and the Superintendent of the British Columbia Lands Branch of this department, the Department of External Affairs in connection with the Lake of the Woods Technical Board, and arrangements are now under way for extensive co-operation with the Nova Scotia Water-powers Commission in investigating the water-power resources of that province. Tentative proposals have also been submitted to the branch looking to the commencement of similar co-operation at an early date in connection with an investigation of the water resources of the province of New Brunswick.

Problems before the International Joint Commission, especially the Lake of the Woods reference, have occupied a very considerable portion of the time of the engineers of the branch. As this is of vital importance to the developed and undeveloped powers on the Winnipeg river in the province of Manitoba, every possible effort is being made to have the importance of the water-powers on the Winnipeg river in Manitoba placed before the commission in the best possible manner. As the special counsel engaged by the branch in connection with this matter, Mr. R. M. Dennistoun, has enlisted for foreign service with the Canadian Expeditionary Forces, the services of Mr. Edward Anderson, K.C., have been recently retained. Arrangements have also been made to have special counsel representing the city of Winnipeg, the Winnipeg Electric Railway Company, the Winnipeg River Power Company, and the power users of the Lake of the Woods, co-operate with Mr. Anderson in having the case of the water-power interests presented to the commission. In connection with the Lake of the Woods reference, the superintendent of the branch has represented the Department of the Interior on the Lake of the Woods Technical Board, an inter-departmental board appointed by the Dominion Government for the purpose of advising the Government direct respecting the Canadian interests involved in the Lake of the Woods reference.

The proposal mentioned in my previous annual report covering the water-power exhibit to show the tremendous water-power resources of Canada, has been successfully worked out, and a very creditable exhibit has been completed and installed in the Canadian Pavilion at the Panama Pacific Exposition. This exhibit is now being used as a basis of an active propaganda throughout the term of the exposition by this branch, to disseminate information regarding developed and undeveloped water-powers throughout the Dominion. Arrangements have also been made to have Canadian power resources brought to the attention of the International Engineering Congress, which is to be held in connection with the exposition in September. Prominent engineers eminent in water-power practice throughout the Dominion have consented to be present at this congress and take part in the discussion of Canada's water-powers, which will follow the presentation of two technical papers prepared, at the request of this branch, by Mr. C. H. Mitchell, consulting engineer, of Toronto. These two papers are included in section No. 10 of this report. Arrangements have also been made for the publication of the following five monographs on the water-powers of Canada, covering the power situation of the various provinces:—

(1) Water-powers of British Columbia, by G. R. G. Conway, Consulting Engineer, Vancouver, B.C.
(2) Water-powers of the Prairie Provinces, by P. H. Mitchell, Consulting Engineer, Toronto.
(3) Water-powers of Ontario, by H. G. Acres, Hydraulic Engineer, Ontario Hydro-Electric Power Commission, Toronto.
(4) Water-powers of Quebec, by F. T. Kaelin, Shawenegan Water and Power Company, Montreal.
(5) Water-powers of the Maritime Provinces, by K. H. Smith, Engineer, Nova Scotia Water Powers Commission, Halifax.

In connection with the permanent exhibit of the Winnipeg Industrial Bureau of the city of Winnipeg, upon the request of Mr. C. F. Roland, Industrial Commis-

sioner, the branch has conceived and carried to completion a water-power exhibit occupying four booths of the bureau which was designed to show the exceedingly fortunate situation of the city of Winnipeg with respect to the water-power available from the Winnipeg river. This exhibit takes the form of an aeroplane view of the southeastern portion of the province of Manitoba, including the city of Winnipeg and the basin of the Winnipeg river. Ranging in front of this aeroplane painting there are eight models of the existing power plants of the municipality of the city of Winnipeg and the Winnipeg Electric Railway Company, also all the proposed power concentrations worked out as a result of the power investigations of this branch. This exhibit has received a great deal of favourable attention from those interested in the power and industrial possibilities of Winnipeg and district, and should accomplish much in advancing the interests of the city by showing in the simplest and most direct manner the future power possibilities within transmission radius of the city. The exhibit has been so constructed that it can be transported to any desirable location. It is understood that the industrial commissioner proposes sending the exhibit to various points in the United States and Canada, as special occasions may offer.

While actual construction operations have not been commenced on any new projects in the Prairie Provinces during the past fiscal year, preparations are under way for the commencement at an early date of several very important developments in various points in the West. Unless the financial stringency due to the disturbed conditions in Europe prevents the financing of these schemes, they will be well under way during the next fiscal year. While this financial stringency may cause some delay in the commencement of new projects, it may be considered to be fortunate in so far as the West is concerned, in that it allows the Dominion Water Power Branch an opportunity of proving or disproving beyond doubt the economic features of important power projects throughout the Prairie Provinces which, owing to their strategic location close to commercial centres, have attracted the promoter and the capitalist and caused them to expend considerable money in endeavouring to work out a method of development which could be approved under the strict practice of this department. Continuous hydrographic studies for a period of several years are essential to the final determination of the economic features of power projects, and it is very satisfactory indeed to know that the important rivers of the provinces of Manitoba, Saskatchewan, Alberta, and British Columbia are now included in the hydrographic work of this department. This work is all being carried on under the most approved practice, by qualified technical officers, and while some more active co-relation of the various organizations is desirable, looking to a concentration of control, the methods that are now employed are quite satisfactory, and a definite understanding as to the field of operations prevents duplication of effort and expense. The present friendly and frank understanding with the various engineers engaged on this work may be considered to be potent of closer connections in the future, of advantage to all concerned.

Following the transfer of the administrative control of the water in the Railway Belt to the province of British Columbia, many matters respecting both water and land administration in the Dominion Railway Belt have arisen between this department and the Provincial Department of Lands. Every effort is being made to have a satisfactory adjustment of these matters. In this connection the Dominion Water Power Branch is exceedingly fortunate in being afforded the advantage of the services of Mr. H. W. Grunsky who acted as legal adviser to the province of British Columbia for several years in connection with water matters. Mr. Grunsky's expert advice will not only be available in connection with these matters, but also in advising and assisting the department in perfecting the water-power administration in the provinces of Manitoba, Saskatchewan, and Alberta.

While, as already stated, the work of the branch has progressed and developed in an entirely satisfactory manner, much difficulty has been realized in having the work

carried on continuously without interruption, owing to the enlistment of members of the staff with the Canadian Expeditionary Forces. During the fiscal year just ended the following have enlisted and are now with the Canadian Expeditionary Forces:—

Lt.-Col. C. H. Mitchell,
Consulting Engineer to the Branch.
Head Office—
H. L. Mainguy,
H. L. Mahaffy.
Manitoba Hydrographic Survey—
P. J. Barry,
E. B. Chalmers,
A. P. Smith.
British Columbia Hydrographic Survey—
C. P. Cotton,
D. O'B. Gill.

Several others have signified their intention of enlisting, including F. S. Smith, A. Pirie, and T. J. Moore.

A survey of the water-power situation in the different countries of the world shows that Canada, the youngest of them all, has accomplished more in actual development and in use than any except, perhaps, Norway. (See plate.) The outstanding feature of the power situation in Canada is the exceedingly fortunate and advantageous location of our water-powers from the Atlantic to the Pacific. Practically every large city is to-day supplied with all the hydro-electric energy it can use from water-power, the sources of which can be extended to meet all anticipated demands. Where the source of energy is not water-power, as in the middle western prairies, there is an abundance of either gas or good steam coal within immediate reach. There is probably no part of the present settled portions of the Dominion where power cannot be profitably produced from wholly Canadian sources. In case of necessity we can be, and in time we shall be, independent of all outside power-producing agencies.

All subtantial and reasonably necessary power requirements throughout Canada have been met and provided for, and much pioneer work has been accomplished in adapting hydro-electric energy to new and highly profitable industrial use. In fact the water-power situation strikingly demonstrates the faith of Canadians in our vast heritage. We have been extending an ever-widening network of transmission lines over our far-flung territories so that to-day, measured by population, we have the highest ratio of water horse-power of any other nation except Norway. On the other hand, as suggesting the room still left for expansion, we have the lowest ratio of water horse-power in proportion to area. The progress of power development in Canada has so far been based on sound engineering, and sure economic principles, and there have therefore been very few financial failures. This has resulted in the popular delusion of the great potential value of undeveloped water-powers and, in some districts, in the general public being unduly apprehensive of the profits and powers of public utility corporations which control or develop existing water-powers.

The great importance of our power resources, their successful adaptation for industrial use and for furnishing so much of our modern comfort has resulted in the general public taking a very marked interest in all questions pertaining to water-power administration, investigation and use, and the question of suitable legislation covering water-power administration and authorization has become one of the most important legislative topics not only in Canada but in other countries, notably in the United States. On the whole, we are exceedingly fortunate in Canada, especially when we compare our conditions with those of the United States. Our water-power laws are, in the main, quite adequate; encouraging to development with due regard to the public interest, present and future. While in some parts of Canada we may have

outgrown former conditions and in such parts governmental machinery and laws with respect to water-powers have not advanced as fast as might be desired, it must be remembered that there is but a short distance in time from the 50 horsepower overshot mill wheel of small efficiency and crude apparatus of local use and of little general importance to the community at large, to the 20,000 horse-power turbine of over 90 per cent efficiency and 200-mile transmission line of to-day, of such widespread importance owing to the present universality of the electrical industry. I am confident that in a very short time our legislators in all parts of the Dominion will have realized the advantage of and have put into force an efficient water-power administration providing reasonable laws under which water-power development will be fostered with due protection to the public interest.

In the lull which has temporarily supervened in power development in Canada, we can look back with satisfaction upon a long period of uninterrupted prosperity and marvellous expansion. This lull should enable the Dominion and Provincial Government Departments interested in water-power matters to perfect their arrangements for securing that physical and economic data which is always essential and a necessary preliminary to the financing of new water-power developments.

While in the past there has been a great lack of reliable data regarding Canadian water-powers, there is now much excellent work under way throughout the Dominion which, if continued and extended without delay, will result in sufficient data being obtained regarding all powers within transmission radius of present or prospective commercial centres being available for consideration when the present financial stringency is relieved.

It has been said that the use of power in Canada for electro-chemistry, electro-metallurgy, and electro-siderurgy has not kept pace with the advance made in these arts in other countries, and on the other hand that certain European countries are using about one-half of their developed water-powers for these latter purposes. It must be admitted that most of the developed power in Canada is used for motive power, traction, and lighting, and but a small percentage for electro-chemistry, electro-metallurgy, and electro-siderurgy. This condition of affairs is probably the result of a young country first meeting its most urgent permanent and "primitive" power requirements, that is, for lighting, traction, and motive purposes, and to temporarily postpone the extensive and intensive adaptation of power for electro-chemical and electro-metallurgical purposes; at any rate until adverse economic conditions and financial hazards surrounding the use of power for such purposes have been overcome. One thing certain, no country in the world has realized greater benefit from the advantages of hydro-electric power for domestic, municipal, and manufacturing purposes, than have the people of the province of Ontario, thanks to the Ontario Hydro-electric Commission.

In a general way, any considerable extension to existing power plants and the development of additional water-powers must depend primarily upon the demand for power from traction, lighting, and motive-power sources, and but secondarily on the possible use of power for electro-chemical, electro-metallurgical, and electro-siderurgical purposes; of course the use of power for pulpmaking alone excepted. Unless we use our power to supply the ever-increasing demand from our southern neighbours in the United States, the first use of power will grow directly with the increase in our population, slowly and steadily at any rate for the next decade. For any considerable increase in our present power demand, except power required for pulpmaking, we must depend largely on proving the commercial possibilities of the use of power for electro-chemical and electro-metallurgical purposes.

The following statistical statement showing the amount of horse-power actually developed in the various provinces, which has been worked out by the engineers of this branch in connection with data for the International Engineering Congress, is of particular interest. Within the provinces of the Dominion, and excluding the

Northwest Territories, practically all of the Yukon and the northern and eastern portions of Quebec, it is estimated that 17,764 horse-power are available, this amount being inclusive in the case of Niagara Falls, Fort Frances, and the St. Marys river at Sault Ste. Marie, of only the development permitted by international treaties, and, further, does not contemplate the full possibilities of storage for the improvement of capacities. The developed powers, which are inclusive of all water-powers, whether for electrical production, pulp grinders, for milling or for the great many other uses, aggregate 1,712,193 horse-power as developed by turbines, and this amount is distributed over the provinces as shown in the following table:—

Province.	Horse-power Developed.
Nova Scotia	21,412
New Brunswick	13,390
Prince Edward Island	500
Quebec	520,000
Ontario	789,466
Manitoba	56,730
Saskatchewan	45
Alberta	33,305
British Columbia	265,345
Yukon	12,000
Total	1,712,193

The Dominion Water Power Branch is endeavouring to afford every possible assistance in the advancement of the water-power interests of the Dominion. Very satisfactory progress along these lines has already been made, and the more the question of power development and use in Canada is considered the greater the opportunities of this branch will become.

Your obedient servant,

J. B. CHALLIES,
Superintendent.

No. 2.

REPORT OF B. E. NORRISH.

OFFICE OF CHIEF DRAUGHTSMAN, March 31, 1915.

SIR,—I beg to submit the following brief statement of work done under my direction during the fiscal year of 1914-15.

The work assigned to this office may be classified as follows:—

(1) *The General Draughting Work.*—This work consists of the compilation of original plans, maps, and diagrams to illustrate all reports of the branch, their preparation for reproduction by the various processes, and their final revision for publication.

The preparation of plans and diagrams to illustrate the printed reports of the branch is the most important work of this office. Full value of our surveys can not be realized until suitable plans have been prepared. It is therefore essential that there should be no delay in having the plans called for completed and made ready for publication.

To successfully cope with this work two draughtsmen and a printer were added to the staff during the past year.

A list of maps and plans prepared for publication during the past year is appended hereto.

(2) *The filing of all official plans.*—The filing and indexing of plans takes up considerable time. We have now 1,335 plans filed for permanent reference and official record.

(3) *The publication and distribution of reports.*—The publication and distribution of reports represents a very large amount of work. In addition to the annual report, there were published during the year:—

Water Resources Paper No. 8.—A report on the British Columbia Hydrographic Survey for the calendar year 1913, by R. G. Swan, B.A.Sc., Chief Engineer.

Water Resources Paper No. 10.—A general guide for the compilation of the water-power reports of the Dominion Water Power Branch, by J. T. Johnston, B.A.Sc., Hydraulic Engineer of the Dominion Water Power Branch.

Water Resources Paper No. 11.—Final report of the Pasquia Reclamation Project, by T. H. Dunn, C.E., O.L.S., Chief Engineer in charge of Reclamation Survey.

Water Resources Paper No. 12.—Report on small Water-powers in Western Canada, and discussion of sources of power for the farm, by A. M. Beale, B.Sc.

These reports contain on an average 150 pages of text, including many tabulated statements and tables. Besides the text of the above reports, fifty-eight photolith plans and maps required personal supervision.

(4) *Special Reports for Panama-Pacific Exposition.*—Copy was prepared for the publication of the following series of five special water-power pamphlets for distribution in connection with the water-power exhibit in the Canadian Pavilion at the Panama-Pacific International Exposition at San Francisco:—

Water-powers of British Columbia, by G. R. G. Conway.
Water-powers of the Prairie Provinces, by P. H. Mitchell.
Water-powers of Ontario, by H. G. Acres.
Water-powers of Quebec, by F. T. Kaelin.
Water-powers of the Maritime Provinces, by K. H. Smith.

These pamphlets contain on an average sixty-one folios of text and sixty-three photo-prints. They are to be printed on best quality coated paper and to be bound with a blue ripple finished bay path cover.

A limited number of the following reports are still available for distribution:—

Annual Report for 1912-13, published 1914.
Annual Report for 1913-14, published 1915.

Water Resources Paper No. 1.—Report of the Railway Belt Hydrographic Survey for 1911-12, by P. A. Carson, B.A., D.L.S., Chief Engineer. Published 1914.

Water Resources Paper No. 2.—Report of Bow River Power and storage investigations (Bow River, West of Calgary) by M. C. Hendry, B.A.Sc., Chief Engineer in charge of surveys. Published 1914.

Water Resources Paper No. 7.—Report on the Manitoba Water-powers, by D. L. McLean, S. S. Scovil, B.Sc., and J. T. Johnston, compiled for the Manitoba Public Utilities Commission. Published 1914.

Water Resources Paper No. 8.—Report of the British Columbia Hydrographic Survey for 1913, by R. G. Swan, B.A.Sc., Chief Engineer. Published 1915.

Water Resources Paper No. 10.—General Guide for Compilation of Water-power Reports of Dominion Water Power Branch, prepared by J. T. Johnston, B.A.Sc., Hydraulic Engineer of Water Power Branch. Published 1915. Limited Edition.

Water Resources Paper No. 11.—Final Report on the Pasquia Reclamation Project, by T. H. Dunn, C.E., O.L.S., Chief Engineer in charge of Reclamation Survey. Published 1915.

Water Resources Paper No. 12.—Report on Small Water-powers in Western Canada, and discussion of sources of power for the farm, by A. M. Beale, B.Sc. Published 1915.

(5) *Photostat Room.*—During the past year the demand for copies of plans, legal documents, and printed matter of all descriptions required throughout the department increased the work of our photostat apparatus to such an extent that it became necessary to secure the services of an expert photographer. This arrangement has proved very satisfactory, since the photographer has not only done all our photostat work but he has also made all the necessary photo-prints of negatives secured by our different engineers in the field. As this work was originally done by outside photographers at considerable expense, a great economy has resulted.

Since the installation of the blue-printing machine in the Railway Lands Branch all the work emanating from this office, and which was formerly done outside the department, has been done in the building. The new arrangement has proved convenient and satisfactory for all work has been of uniformly excellent quality and completed without vexatious delays.

The staff now consists of six draughtsmen, an expert printer, a photostat operator, a filing clerk, a distribution clerk, and a stenographer.

With regard to the publication of reports I would call your attention to the necessity for securing the services of an editor of technical standing who could edit and proof-read the reports received from the different engineers. This would not only result in a very material gain to our reports both in uniformity and style, but would facilitate early and prompt publication.

I have the honour to be, sir,
Your obedient servant,

B. E. NORRISH,
Chief draughtsman.

LIST OF MAPS AND PLANS prepared for publication during the past year.

Title.	Accompanying.
Map of Southern Manitoba showing the existing plants and possible sites on the Winnipeg River. Scale 9 miles to 1 inch.	Annual Report 1914.
Map of Winnipeg River Basin. Scale 80 miles to 1 inch	Annual Report 1914.
Profile of Winnipeg River in Manitoba showing existing plants and proposed sites.	Annual Report 1914.
Map of Manitoba showing location of gauging stations. Scale 60 miles to 1 inch.	Annual Report 1914.
Map of Southern British Columbia showing gauging stations. Scale 30 miles to 1 inch.	Annual Report 1914.
Plan of metering apparatus for boats and canoes	Annual Report 1914.
Vancouver Power Company. Plan showing layout of Coquitlam Dam. Scale 250 feet to 1 inch.	Annual Report 1914.
Vancouver Power Company. Plan of cross section of Coquitlam Dam. Scale 150 feet to 1 inch.	Annual Report 1914.
Plan showing location of Coquitlam tunnel and layout of the power development of the Vancouver Power Company, Limited, New Westminster District, British Columbia.	Annual Report 1914.
Map of Alberta showing water-power and storage investigations during 1913–14. Scale 80 miles to 1 inch.	Annual Report 1914.
Plan showing general layout of Cole Falls Development by the City of Prince Albert.	Annual Report 1914.
Plan showing typical section of dam. Cole Falls development.	Annual Report 1914.
Kananaskis Falls dam, Bow River, Calgary Power Company, showing general design.	Annual Report 1914.
Plan showing general section, Kananaskis Falls development. Calgary Power Company, Limited.	Annual Report 1914.
Sixteen topographic sheets. Pasquia Reclamation. Accompanying Final Report on Pasquia Reclamation Project by T. H. Dunn, C.E., O.L.S., Chief Engineer in charge of reclamation survey.	Water Resources Paper No. 11.
General plan of Winnipeg River Basin	Water Resources Paper No. 3.
Profile of the Winnipeg River in Manitoba showing existing and proposed developments (3 sections).	Water Resources Paper No. 3.
Plan of outlets of Lake of the Woods	Water Resources Paper No. 3.
Plan and typical section of Winnipeg Electric Railway Company's diversion weir. Pinawa Channel, Winnipeg River.	Water Resources Paper No. 3.
Plan of the Winnipeg Electric Railway Company's plant on Pinawa Channel.	Water Resources Paper No. 3.
Plan of Kenora power station, Eastern outlet of Lake of the Woods	Water Resources Paper No. 3.
Plan of Norman dam. Western outlet of Lake of the Woods	Water Resources Paper No. 3.
Plan of St. Francis dam, outlet of Rainy lake	Water Resources Paper No. 3.
Plan of Kettle falls dam, outlet of Namakan lake	Water Resources Paper No. 3.
Plan of proposed layout. Pine falls site. Winnipeg River	Water Resources Paper No. 3.
Sections and elevations of proposed dam, Pine falls site	Water Resources Paper No. 3.
Plan of channel excavation at White Mud falls. Winnipeg River	Water Resources Paper No. 3

LIST OF MAPS AND PLANS prepared for publication during the past year.—*Concluded.*

Title.	Accompanying.
Plan of proposed layout at Du Bonnet site. Winnipeg River	Water Resources Paper No. 3.
Plan and section of proposed power station, Du Bonnet site, Winnipeg River	Water Resources Paper No. 3.
Plan and elevations of proposed power station, Du Bonnet site, Winnipeg River.	Water Resources Paper No. 3.
Sections and elevations of proposed dam, du Bonnet site, Winnipeg River	Water Resources Paper No. 3.
Plan of Lac du Bonnet	Water Resources Paper No. 3.
Plan and section of proposed power station, McArthur site, Winnipeg River	Water Resources Paper No. 3.
Sections and elevations of proposed dam at McArthur site, Winnipeg River	Water Resources Paper No. 3.
Plan of proposed layout at lower Seven Sisters site, Winnipeg River	Water Resources Paper No. 3.
Plan and section of proposed power station at lower Seven Sisters site, Winnipeg River.	Water Resources Paper No. 3.
Section and elevations of proposed dam at lower Seven Sisters site, Winnipeg River.	Water Resources Paper No. 3.
Plan of proposed layout at upper Seven Sisters site, Winnipeg River	Water Resources Paper No. 3.
Plan and section of proposed power station at upper Seven Sisters site, Winnipeg River.	Water Resources Paper No. 3.
Plan and section of proposed power station, Pine falls site, Winnipeg River	Water Resources Paper No. 3.
Sections and elevations of proposed dam, upper Seven Sisters site, Winnipeg River.	Water Resources Paper No. 3.
General layout plan of upper portion of Pinawa Channel	Water Resources Paper No. 3.
Plan of proposed layout at upper Pinawa site, Winnipeg River	Water Resources Paper No. 3.
Plan and section of proposed power station, upper Pinawa site, Winnipeg River.	Water Resources Paper No. 3.
Plan of proposed layout at Slave Falls site, Winnipeg River	Water Resources Paper No. 3.
Plan and section of proposed power station, Slave falls site, Winnipeg River	Water Resources Paper No. 3.
Sections and elevations of proposed dam, Slave falls site, Winnipeg River	Water Resources Paper No. 3.
Plan showing domestic coal consumption in Western Canada	Water Resources Paper No. 3.
Map of district tributary to Winnipeg River power	Water Resources Paper No. 3.
Geologic map of Winnipeg River Basin	Water Resources Paper No. 3.
Map of Southern British Columbia showing gauging stations	Water Resources Paper No. 8.
Map of Southern British Columbia showing gauging stations	Water Resources Paper No. 14.

No. 3.

REPORT OF PERCY WILKINSON.

Ottawa, March 31, 1915.

Sir,—I beg to submit the following report for the fiscal year 1914-15.

SYSTEM OF ACCOUNTING.

For the better administration of the Water Power appropriation, the fiscal year is divided into four periods, each of three months. Advances are made to each of the chief engineers in charge of field parties upon their furnishing the office at Ottawa with a statement on a prescribed form showing in detail for what purposes the advance is required. At the end of each period of three months the accounts covering the period are prepared and submitted to the Ottawa office, together with the requisition for a further advance to cover the succeeding period. Upon the receipt of these accounts in Ottawa, they are carefully checked and, when considered to be in order, are submitted to the superintending accountant for final examination.

GENERAL.

Number of accounts dealt with	517
Amount of accounts	$160,270.90
Number of cheques forwarded	838

STAFF REPORT.

LIST OF EMPLOYEES, Water Power Branch, giving the name; classification, and duties of office of each.

INSIDE SERVICE.

Name.	Classification.		Duties of Office.	Remarks.
	Division.	Sub-division.		
J. B. Challies, C.E.....	1	B	Superintendent.....	
Correspondence—				
E.S. Forbes.....	2	A	Correspondence Clerk.	Transferred from Minister's Office January 12, 1914.
Miss C. J. McIlmoyle	3	A	Stenographer.....	Transferred to B.C. Lands Branch, June 4, 1914.
" E. A. McKenzie.	3	B	"	
" M. M. Spence....	3	B	"	
" M. C. King.....	3	B	"	
" L. J. Barber.....	3	B	"	
" E. A. Grant.....	3	A	"	Transferred from Mining Lands and Yukon Branch, December 23, 1914.
Messengers.				
E. B. Boselly.....	.....	.....	Messenger.....	Died April 20, 1914.
F. L. Connelly.....	.....	.....	"	Transferred to Mining Lands and Yukon Branch, March 11, 1915.
Accounts and Supplies, etc.				
Percy Wilkinson.....	3	A	Accountant.....	
General Administration.				
W. E. Weld, D.L.S.....	2	A	Engineer.....	Transferred from Topographical Surveys Branch, July 7, 1914.
A. M. Beale, B.Sc.....	2	A	"	
Draughting Room.				
B. E. Norrish, M.Sc....	2	A	Chief Draughtsman..	
F. W. Brander.....	2	B	Draughtsman.....	
G. E. Jones.....	2	B	"	
W. L. Brown.....	2	B	"	
N. T. Allan.....	2	B	"	Transferred to Inside Service, November 12, 1914.
S. Witten.....	3	A	Clerk.....	

LIST OF EMPLOYEES, Water Power Branch, giving the name, classification, and duties of office of each.—*Continued.*

OUTSIDE SERVICE.

Name.	Duties of Office.	Remarks.
HEAD OFFICE.		
Draughting Room.		
C. V. Cameron	Draughtsman	
W. Cook	Clerk	Granted leave without pay October 1, 1914, to March 31, 1915.
N. T. Allan	Draughtsman	Appointed May 1, 1914. Transferred to Inside Service November 12, 1914
J. C. Donaldson	Photostat Operator	Appointed October 20, 1914.
W. White	Clerk	Appointed January 4, 1915.
E. Stanford	Printer	Appointed February 22, 1915.
General Administration.		
H. W. Grunsky	Expert Adviser on Water Administration	Appointed December 7, 1914.
Engineering Administration and Investigation.		
J. T. Johnston, B.A. Sc	Chief Hydraulic Engineer in Charge.	
Head Office.		
J. R. Bissett, B.A.Sc	Engineer	Transferred to Alberta and Saskatchewan Power Surveys, June 1, 1914
N. E. D. Sheppard, B.A.Sc	"	Appointed June 24, 1914.
J. E. A. Warner, B.Sc	"	Mar. 1 to March 31, 1915.
J. T. Rose, B.A.Sc	"	Appointed July 7, 1914, granted leave without pay October 10, 1914, to March 31, 1915.
H. E. M. Kensit	Electro-Mechanical Engineer	Re-appointed February 5, 1915.
Manitoba Hydrographic Survey.		
M. C. Hendry, B.A.Sc	Chief Engineer	Transferred from Bow River Power and Storage Surveys, April 1, 1914.
S. S. Scovil, B.Sc	Assistant Chief Engineer	Temporarily transferred to Lake of the Woods Technical Board, June 1, 1914.
E. B. Patterson, B.A. Sc	Assistant Engineer	
W. J. Ireland	"	
S. C. O'Grady	"	
G. K. Gainsford	"	Appointed November 25, 1914.
D. B. Gow, B.Sc	"	
G. J. Lamb	"	Granted leave without pay Nov. 1, 1914. to March 31, 1915.
M. S. Madden, B.Sc	"	
T. J. Moore	"	
A. Pirie	"	
C. Allen	Junior Assistant Engineer	
P. J. Barry	Chief Draughtsman	Enlisted for Active Service, Aug., 1914.
E. B. Chalmers	Draughtsman	" " "
A. P. Smith	"	" " "
F. S. Smith	"	
W. H. Wallace	"	
C. Greenwood	Accountant	
W. H. Bartlett	Clerk	
J. Jarrett	Stenographer	
BRITISH COLUMBIA HYDROGRAPHIC SURVEY.		
R. G. Swan, B.A. Sc	Chief Engineer	
E. M. Dann, Grad. S.P.S., D.L.S.	Division Engineer	
C. G. Cline, B.A.Sc., D.L.S	"	
C. E. Richardson, B.A.Sc.	"	

LIST OF EMPLOYEES, Water Power Branch, giving the name, classification, and duties of office of each.—*Concluded.*

OUTSIDE SERVICE.—*Concluded.*

Name.	Duties of Office.	Remarks.
BRITISH COLUMBIA HYDROGRAPHIC SURVEY.—*Concluded.*		
K. G. Chisholm, B.Sc.	Assistant Engineer	
C. E. Webb, B.A.Sc.	"	
H. J. E. Keys, B.A	"	Resigned June 2, 1914.
D. O'B. Gill, B.Sc.	Assistant Engineer	Appointed April 1, 1914. Enlisted October 31, 1914.
J. A. Elliott, B.A. Sc.	"	Appointed May 1, 1914.
H. C. Hughes, B.Sc.	"	Appointed May 1, 1914...
C. P. Cotton	"	Appointed May 8, 1914. Enlisted August 17, 1914.
C. B. Corbould, B.A.Sc.	"	Appointed May 10, 1914.
E. H. Tredcroft	"	Appointed May 1, 1914.
H. O. Dempster, B.Sc.	"	Appointed March 17, 1915.
F. MacLachlan	Accountant	
A. T. Milner	Clerical Assistant	
G. K. Beeston	"	Appointed May 1, 1914.
Miss B. B. Allan	Stenographer	
" W. M. Robinson	"	
ALBERTA AND SASKATCHEWAN POWER AND STORAGE SURVEYS.		
C. H. Attwood, O.L.S.	Chief Engineer	
J. R. Bissett, B.A.Sc.	Assistant Engineer	Transferred from head office, June 1, 1914.
B. B. Hogarth, B.A.Sc.	"	
RECLAMATION SURVEYS.		
T. H. Dunn, C.E., O.L.S.	Chief Engineer	
O.W.N. Charlton, B.A.Sc.	Assistant Engineer	Resigned September 30, 1914.
G. G. McEwen, B.A.Sc.	"	
H. L. Mainguy	"	Appointed July 1, 1914. Enlisted November, 1914.
F. N. Sproule	Jr. Assistant Engineer	Appointed July 1, 1914.
Geo. Wood	"	Appointed April 28, 1914. Granted leave without pay September 30, 1914, to March 31, 1915.
PANAMA PACIFIC AND WINNIPEG INDUSTRIAL BUREAU EXHIBITS.		
K. H. Smith, B.A.	Chief Engineer	
G. H. Challies	Assistant Engineer	
H. L. Mahaffy	Jr. Assistant Engineer	April 23 to August 31, 1914. Granted leave without pay, August 31, 1914, to March 31, 1915.

I have the honour to be, sir,
Your obedient servant,

PERCY WILKINSON,
Accountant.

No. 4.

REPORT OF J. T. JOHNSTON.

OTTAWA, March 31, 1915.

SIR,—I have the honour to submit herewith the report covering the field organization and general administration and executive work carried on under the jurisdiction of the Water Power Branch during the past year.

HYDROGRAPHIC SURVEYS.

British Columbia Hydrographic Survey.

The British Columbia Hydrographic Survey, under Mr. R. G. Swan as Chief Engineer, has been aggressively carried on during the past fiscal year in a manner consistent with the work and programme of the preceding year. An endeavour has been made to enlarge the scope of the stream measurement work to include all rivers and streams within reach of the field organizations, the run-off of which may in the future be contentious or valuable in the interests of water supply, irrigation, or power.

The work has been largely confined to the southern portion of the province, lack of funds and difficulties in the way of transport preventing the enlargement of the work to cover the northern portion. Advantage has been taken of this concentration of the field activities to place the work, in the section of the province covered, on a thoroughly permanent and reliable basis. Cable stations have been installed, automatic gauges placed, and metering sections accurately fixed and rated and, in short, every effort has been made to establish the work on a basis which should result in greatly decreased maintenance and operative charges in the future. It is hoped, as a result of this, that it will be possible to undertake stream measurement work in the new district to the north during the present season, and at no increase in the general cost of the work over that for the past year.

The hydrographic staff has co-operated continuously and effectively with the British Columbia Lands Branch, and with the Dominion Parks Branch, inspecting and reporting on engineering problems in the Railway Belt in connection with irrigation and drainage projects, foreshore applications for leases in connection with quarrying, the removal of sand and gravel, and marine docks and elevators. Many water supply projects and problems have been reported on, and co-operation with power interests in various parts of the province has been arranged on a basis satisfactory to all concerned.

The staff has been able to afford the Conservation Commission of Canada very efficient service in the collation of water-power data for use in connection with its report on the water-powers of the province.

The co-operation between the Provincial Water Rights Branch and the Hydrographic Survey has been continued to the mutual satisfaction of each.

The field organization has been continued as outlined in last year's annual report, and in Mr. Swan's full report (No. 5) attached hereunder. This organization has been found to work harmoniously and efficiently, and copes with the work in an entirely satisfactory manner.

During the year, the first stream measurement report covering the field work to the end of 1912 has been issued as Water Resources Paper No. 1. The second report, covering the work to the end of 1913, has been published under the title of Water

Resources Paper No. 8. The material for the third covering the work to the end of the year 1914 is now prepared, and will be submitted to the printers within a few days. It will be published as Water Resources Paper No. 14.

These reports are available for distribution to all interested in problems affected by the run-off of the rivers of British Columbia.

Manitoba Hydrographic Survey.

The regular stream measurement work in the province of Manitoba has been carried on continuously and aggressively under Mr. M. C. Hendry as chief engineer. Mr. Hendry took over the immediate direction of the work in June, 1914, prior to which date it had been most energetically and efficiently carried on under the direction of Mr. S. S. Scovil as acting chief engineer. Owing to Mr. Scovil's personal knowledge of the questions involved in the Lake of the Woods reference before the International Joint Commission, he was placed in charge of the storage and run-off investigations undertaken in this connection by the Lake of the Woods Technical Board.

The regular stream measurement stations have been maintained throughout the year, and their number has been considerably augmented to include rivers whose importance demand early attention. Miscellaneous measurements have been secured on the important rivers flowing into lake Winnipeg from the east. Lack of transportation facilities and sparseness of settlement throughout this region prevent the present establishment of regular stations on these rivers, with the exception of the Winnipeg and Manigotagan.

The most important new stream measurement work undertaken was that in connection with the Nelson river. The vast importance of the power resources of this river renders essential the early securing of reliable records of its run-off. The remoteness of the river and the magnitude of its flow make the problem of securing a reliable and continuous discharge record one of very great difficulty. A station was, however, established by Mr. G. J. Lamb, of Mr. Hendry's staff, a short distance above the Manitou rapids, and continuous records were secured from July to freeze up, and from January to date. This work will be continued during the present year, and with better equipment. The progress of the construction of the Hudson Bay railway is tending to make work in this territory more practicable and more readily supervised.

Particular attention has been given to the Winnipeg river flow, in connection with the power and storage studies which have been under way along this river. In this connection the rating of the power station of the Winnipeg Electric Railway has been of particular value.

Arrangements have been made for the installation of several automatic gauges along the Winnipeg river and on various important rivers throughout the province. The increased accuracy of the records resulting from these installations will have a vital bearing on many of the important questions now before the Water Power Branch.

Mr. Hendry's full report of the Manitoba work (No. 6) is attached hereunder, and outlines in detail its extent and scope.

The first stream measurement report of the Manitoba Survey to the end of the year 1915 is now practically completed, and will be forwarded to the printers within a few weeks. It will be published as "Water Resources Paper No. 4."

The Manitoba Hydrographic Survey staff co-operated closely with Mr. T. H. Dunn, Reclamation Engineer, in his drainage investigations throughout the province.

General Notes.

The evaporation station established at Keewatin on the lake of the Woods has been continuously operated, general meteorological records being secured throughout the year, and evaporation records throughout the open-water season. The information

thus being made available is of particular interest to the storage studies throughout the watershed, which studies are of pressing importance to the power situation on the lower Winnipeg river in Manitoba.

A second evaporation station has been maintained at Winnipeg Beach on lake Winnipeg, for the purpose of securing data covering the central portion of Manitoba. Other stations are contemplated throughout the province.

Arrangements have been made with the Meteorological Service of Canada for the establishment of a fully equipped station at the power plant of the Winnipeg Electric Railway Company on the Pinawa channel. This forms a very central location for the study of the general meteorological conditions maintaining on the power reach of the Winnipeg river in Manitoba.

Recommendations as to Future Work.

In the province of British Columbia it is of the utmost importance that early steps be taken towards securing records of the rivers in the northern portion of the province more particularly along the lines of the Grand Trunk Pacific and the Pacific Great Eastern railways. The rivers in these districts are of outstanding importance to the general development of the province and a study of their run-off cannot be too early started. The work throughout the southern portion of the province is well established, and can now be maintained and continued efficiently and economically, such expansion taking place as is dictated by local development.

Stream measurement work throughout the northern and northeastern section of Manitoba is being undertaken as rapidly as transportation facilities will permit. The facilities offered by the construction of the Hudson Bay railway are being fully utilized in this connection. It is most important that the work in this section be continuously pressed in view of the opening up of the territory due to the railway construction now under way. The Nelson river work is of particular interest from a future power standpoint, and a continuous and accurate record of its flow forms one of the principal divisions of the northern Manitoba work.

The continuation of the hydrographic work in the settled portions of the province is being continuously simplified by the installation of permanent equipment. During the present season it is desirable that more attention be given to the run-off conditions maintaining in the extreme southerly and southwesterly, or the drier sections of the province. Problems of water supply will arise in this section in the future, and a thorough knowledge of the surface run-off is an essential preliminary.

The question of underground flow has been referred to in previous reports, and is again brought up by Mr. Hendry and by Mr. Dunn. The importance of this study to many water supply and drainage problems is so well recognized that it scarcely requires emphasis at this stage. Definite steps should be taken during the forthcoming season towards the commencement of this work.

Power and Storage Surveys.

Power and storage investigations have been continued during the year in connection with the administration of the water-powers throughout Alberta, Saskatchewan, and Manitoba.

MANITOBA.

Of the Manitoba power rivers investigated to date by the engineers of the Water Power Branch, the Winnipeg is by far the most important.

Winnipeg River.

The power survey of the Winnipeg river in Manitoba was continued during the past year in so far as it was necessary to close the gap previously left in the field work

above the diversion weirs of the Winnipeg Electric Railway Company. Problems arising in connection with the lands applied for by the company also necessitated a more accurate delineation of the bank contours along the Pinawa channel than had previously been secured.

The entire series of topographic field plans, covering the river from lake Winnipeg to the city of Winnipeg municipal plant at Point du Bois is now complete and ready for publication. Sheets showing the extent of flooding above the city plant are also available. In all, fifty-six sheets have been plotted.

The studies which have been under way in this office, based on the above plans and field work, and looking to the laying down of a comprehensive hydro-electric and power scheme covering the development of the entire Winnipeg river power resources in Manitoba have been completed and a full report is now practically ready for publication. It will be issued as "Water Resources Paper No. 3."

Summary of Power and Storage Studies on the Winnipeg River.

Progress summaries of the work have appeared in previous annual reports, and the final revised conclusions are submitted herewith.

The principal result of the power and storage investigations can be briefly summarized by stating that it has been determined that a minimum flow of 20,000 cubic feet per second is feasible at all seasons, under an efficient and systematic control of the river run-off, and that it is possible to concentrate practically the entire unused river fall in Manitoba into seven economic power concentrations with a minimum output of 175,000 continuous 24-hour power under present conditions of flow, and of 313,000 horse-power with the river regulated to a 20,000 second-foot minimum. These power concentrations, together with the existing plants will conserve to the utmost the power resources of the river in Manitoba, and will supply a total ultimate output of over 420,000 continuous horse-power.

The main features of the investigations are summarized below:—

(1) A complete contour survey has been made of the Winnipeg river in Manitoba from the mouth of the river to the headwaters of the city of Winnipeg municipal plant at Point du Bois. This survey has been supplemented by detail cross-sections and soundings at all falls and rapids where lower concentration is in prospect. All existing dams, weirs, bridges, and permanent works have been tied in to the basin field survey lines.

(2) A permanent system of bench-marks, located on the bedrock and tied in to sea-level datum, has been established throughout the entire power reach.

(3) The complete survey notes have been plotted on standard topographic sheets, and are appended to this report.

(4) Seven points of concentration have been selected as the prospective sites of future power development. These sites will develop practically the entire remaining drop of the Winnipeg river in Manitoba, unutilized by the present existing power plants on the river.

(5) At each of these seven sites, detail layouts and designs covering a feasible method of development have been prepared, and the estimated cost of development, maintenance, and operation has been deduced, for the double purpose of comparing their individual engineering features and their commercial possibilities.

(6) The seven proposed power concentrations with estimated capital and operating costs are listed in tables 1, 2, 3 and 4 hereunder.

TABLE 1.—Undeveloped Power Sites on the Winnipeg River in Manitoba.

Site.	Distance from Winnipeg in Miles.	Head.	Power Available.			
			24 Hour Power at 75% Efficieney.		Turbine Installation (units considered).	
			12,000 Sec.-ft.	20,000 Sec.-ft.	12,000 Sec.-ft.	20,000 Sec.-ft.
1.	2.	3.	4.	5.	6.	7.
Pine Falls	64	37	37,900	63,100	6–10,000	10–10,000
Du Bonnet Falls	64	56	[1]57,300	95,500	[1]9–10,000	14–10,000
McArthur Falls	62	18	18,400	30,700	11–2,500	17–2,500
[2]Lower Seven Sisters	52	37	12,600	37,900		6–10,000
[2]Upper Seven Sisters	55	29	9,900	29,600		8–6,000
[3]Upper Pinawa	58	18	12,300	12,300	4–4,500	4–4,500
Slave Falls	74	26	26,600	44,400	8–5,000	13–5,000
Total			175,000	313,500	235,500	573,500

[1] This tabulation assumes an initial development at the Du Bonnet site, utilizing 12,000 second-feet at 56-foot head.

[2] The Upper and Lower Seven Sisters sites are located in the main channel of the Winnipeg river, paralleling the Pinawa through which 8,000 second-feet is assumed to be diverted for the operation of the Winnipeg Electric Railway plant.

[3] The Upper Pinawa site is located on the Pinawa channel.

TABLE 2.—Total Power Developed and Undeveloped on the Winnipeg River in Manitoba.

	Unregulated Flow, 12,000 sec.-ft.	Regulated Flow, 20,000 sec.-ft.
Undeveloped at proposed sites	175,000	313,500
Undeveloped at Point Du Bois	21,100	51,800
Developed on river to date	53,200	53,200
Total	249,300	418,500

NOTE.—Power in terms of 24-hour horse-power at 75% efficiency.

TABLE 3.—Estimated Capital Cost of developing the proposed Power Sites on the Winnipeg River in Manitoba. Power placed on the low tension switchboard in the Power Station.

Site.	Capital Cost on low tension switchboard in Power Station.					
	Total Cost.		Per H.P. on basis of 75% Efficiency, 24-hour power.		Per H.P. on basis of Installation.	
	12,000 Sec.-ft.	20,000 Sec.-ft.	12,000 Sec.-ft.	20,000 Sec.-ft.	12,000 Sec.-ft.	20,000 Sec.-ft.
1	2	3	4	5	6	7
	$	$	$ c.	$ c.	$ c.	$ c.
Pine Falls	3,057,000	4,407,000	80 66	69 84	50 95	44 07
Du Bonnet Falls	[1]4,624,000	6,551,000	80 70	68 60	53 80	46 79
McArthur Falls	2,031,000	2,740,000	110 38	89 25	73 88	64 47
Lower Seven Sisters[2]	.....	3,409,000	.....	89 95	.....	56 82
Upper Seven Sisters[2]	.....	2,724,000	.....	92 03	.....	56 75
Upper Pinawa	1,280,000	1,280,000	104 07	104 07	71 11	71 11
Slave Falls	2,327,000	3,436,000	87 50	77 39	58 20	52 86
Total	13,319,000	24,547,000	.....	.....	.....	.....
Mean (based on power output)	.....	.....	87 30	78 30	56 60	42 80

[1] Proportional capital cost of development of 12,000 second-feet at 56-foot head.
[2] Upper and Lower Seven Sisters sites are not feasible of development until the river flow is more systematically regulated.

TABLE 4.—Estimated Annual Cost of operation of the proposed power developments on the Winnipeg River in Manitoba. Power placed on the low tension switchboard in the Power Stations.

Site.	Annual Operating Cost on low tension Switchboard in Power Station									
	Total Annual Cost.		Per H.P. on basis of 75% Efficiency 24 hour power.		Per H.P. on basis of Installation.		Per K.W. hour 100% Load Factor.		Per K.W. hour 50% Load Factor.	
	12,000 Sec.-ft.	20,000 Sec.-ft.	12,000 Sec.-ft.	20,000 Sec.-ft.	12,000 Sec.-ft	20,000 Sec.-ft	12,000 Sec.-ft.	20,000 Sec.-ft.	12,000 Sec.-ft.	20,000 Sec.-ft
1	2	3	4	5	6	7	8	9	10	11
	$	$	$ c.	$ c.	$ c.	$ c.	cents.	cents.	cents.	cents.
Pine Falls	303,000	447,000	8 00	7 08	5 05	4 47	0·122	0·108	0·244	0·216
[1]Du Bonnet Falls	[1]433,000	635,000	[1]7 56	6 65	[1]5 04	4 54	[1]0·116	0·102	[1]0·232	0·204
Mc Arthur Falls	199,000	272,000	10 82	8 86	7 24	6 40	0·166	0·136	0·332	0·272
[2]Lower Seven Sisters Falls	.....	328,000	.....	8 65	.....	5 47	.....	0·132	.....	0·264
[2]Upper Seven Sisters Falls	.....	268,000	.....	9 05	.....	5 58	.....	0·138	.....	0·276
Upper Pinawa	128,000	128,000	10 40	10 40	7 11	7 11	0·159	0·159	0·318	0·318
Slave Falls	228,000	338,000	8 58	7 62	5 70	5 21	0·131	0·117	0·262	0·234
Total	1,291,000	2,416,000	.....	.....	.....	.....	.....	.....	.....	.....
Mean (based on power output)			8 47	7 71	5 48	4 21	0·130	0·118	0·260	0·236

[1] Proportional annual cost of development of 12,000 second-feet at 56-foot head.
[2] Upper and Lower Seven Sisters sites are not feasible of development until the river flow is more systematically regulated.

(7) The total dependable power on the river in Manitoba, based on a regulated minimum flow of 20,000 cubic feet per second, including that available at the two power stations already in operation is 418,000 horse-power in terms of 24 hours continuous power.

(8) Permanent metering stations have been established at Slave falls on the power reach in Manitoba, at the head of the Pinawa channel, at the outlets of the Lake of the Woods, and on the Whitemouth river. Miscellaneous measurements have been secured throughout the basin. All early run-off records, and records secured by other organizations such as the Dominion Department of Public Works, the Ontario Hydro-Electric Commission, and the United States Geological Survey have been collated.

(9) The power station of the Winnipeg Electric Railway Company and the Kenora municipal power station have been rated.

(10) Existing records of lake levels, head-and-tail water elevations, power loads, and of precipitation and temperature have been collated and studied.

(11) A fully equipped evaporation station has been established on the Lake of the Woods.

(12) The storage necessities and possibilities of the watershed have been exhaustively analysed, and the steps necessary to ensure an adequate minimum flow at the various vital points on the river determined.

(13) A study has been made of existing water rights throughout the basin and of international questions which have arisen in connection with the boundary waters.

(14) The possibilities of future navigation have been given full consideration. The limiting head and tail water elevations proposed will permit of the ready canalization of the river, while provision has been made for the inclusion of lockage facilities in the provisional layouts, should the future canalization of the river ever become desirable.

(15) Existing power plants and all other vested interests along the river have been carefully studied.

(16) Present and future market conditions and possibilities for the utilization of the Winnipeg river power have been investigated.

(17) A consecutive policy looking to the full realization of the power resources of the river basin, according to the best principles of conservation, has been determined for the future guidance of hydro-electric development.

Conclusions from Investigations.

The detail study which has been given to the power and storage questions involved in the proper utilization of the resources of the Winnipeg river watershed has of necessity been extended to cover the ways and means by which the vast power resources now lying dormant can be made fully available for the public good. The more important conclusions may be summarized.

Full realization of the power resources of the Winnipeg river in Manitoba is only attainable by a power system in which each developed site forms a component link in a comprehensive scheme, looking to the development of the entire river reach. Such a power scheme is outlined and discussed in Water Resources Paper No. 3, and furnishes the basic principles for the guidance of future hydro-electric development. Due to the interdependence of a series of hydro-electric plants such as is proposed, and to the conflict of head and tail water elevations, satisfactory operation can only be realized through an independent supervising control over local pond regulation.

Full realization of the power resources of the Winnipeg river in Manitoba is possible only through an exhaustive measure of run-off control, and feasible only through the establishment of storage reservoirs in the upper watershed. Due to the

conflicting requirements of the lumbering, fishing, navigation, and power interests represented in the watershed, a proper run-off control, satisfactory to all, can best be insured by some central governmental authority possessing the full confidence of all interests affected, and having entire authority over all questions affecting lake, reservoir, and pond levels, and over all questions of river flow and of discharge requirements. This authority can only be properly exercised through government-owned or operated storage reservoirs.

As a result of the exhaustive nature of the data gathered in the power and storage studies, the Dominion Water Power Branch is now in a position to intelligently supervise a comprehensive power system such as is proposed for the development of the river, and to ensure the maximum utilization and preservation of its power resources.

The full conservation of the power resources of the watershed requires also the institution throughout the basin of a systematic policy looking to a proper preservation of the forest cover which now so effectively assists in natural regulation of the river flow. Consistent steps have already been taken to this end by the Dominion Water Power Branch.

To realize the maximum power output of the Winnipeg river in Manitoba will require the most thorough and scientific control of the forest and water resources of the entire watershed, by an authority with sufficient power and breadth of view to ensure that all affected interests receive their just due.

Recommendations.

As a result of the power and storage studies now successfully completed in so far as is necessary to outline a comprehensive scheme of power development and to enunciate a policy suitable to the proper operation of such a system as is proposed, the following recommendations are deemed advisable:—

(1) All future hydro-electric, milling, or industrial undertakings acquiring power privileges on the power reach of the Winnipeg river in Manitoba, should be authorized only in accordance with the general scheme of power development outlined in Water Resources Paper No 3, or in accordance with such modifications of the same as may be considered advisable as a result of the further information and data being secured by the continuance of the present studies.

(2) Authority for all such undertakings should fully protect the head and tail water levels, not only of all existing interests on the river, but also of all sites of future power concentration.

(3) Authority for all such undertakings should retain to the Government a measure of supervising local pond control for the protection of other plants on the river.

(4) Authority for all such undertakings should call for the bearing by the lessee of the cost of reservoir construction and of storage control operation and maintenance, in proportion to the benefits accruing to the lessee therefrom.

(5) The establishment of new regulating reservoirs should be undertaken by the Crown, and the cost of constructing the necessary dams and regulating works, as well as of maintaining and operating the same, should be apportioned among the various power undertakings benefiting therefrom, in proportion to the benefits accruing.

(6) An appraisal of the value of existing storage works throughout the watershed should be undertaken by the Government, with a view to their ultimate purchase or expropriation, the cost of such purchase or expropriation to be apportioned among the power users benefiting from the use of the storage, in proportion to the benefits accruing.

(7) All matters pertaining to the regulation of the lake and reservoir levels, and to questions of run-off and discharge requirements, should be under the joint control of the Dominion Water Power Branch and the Hydro-Electric Power Commission of the province of Ontario; or, failing this, of a governmental board or commission. The controlling body must have the full confidence of all interests affected by questions of run-off and lake levels, and must possess entire authority and exercise its control actively and directly.

(8) Some definite measures of forest preservation should be instituted in the immediate future, and be continuously maintained. These measures should include effective protection from fire ravages, scientific timber cutting and lumbering, and systematic reforestation.

(9) All lands which will be necessary for or affected by the future construction of power undertakings or of storage works, should be reserved to the Crown.

(10) The present studies should be aggressively continued, more particularly with respect to the storage requirements and possibilities of the basin. Among the various phases of activity which are essential to the proper future control of the water resources of the river basin are: Continuous stream measurement records at all vital points; continuous surface level records of all prospective and existing reservoirs; continuous evaporation records in various parts of the watershed; the establishment of numerous precipitation stations; the prosecution of reconnaissance surveys for the investigation of storage possibilities; the rating of all power stations, mills, dams, and weirs in the watershed; a study of the relation between the various existing reservoirs and storage prospects, and the existing plants and possible power sites; continuous surface level records under all stages of flow at all vital points on the power reach of the river in Manitoba; and the maintenance of an efficient policy of forest preservation and protection.

MANITOBA RIVERS.

The general power and storage studies carried on under Mr. Hendry's direction in Manitoba, are fully referred to in his report (No. 6) attached hereunder.

Detail attention has been given to the Berens, Pigeon, and Bloodvein rivers, flowing into lake Winnipeg from the east. These rivers flowing through a Laurentian formation, with typical falls and rapids, and with outcropping granite, provide ideal sites for the development of small water-powers, and will be an outstanding feature in the future development of this portion of the province.

There has been a continuation of the storage studies of the headwater lakes of the Little Saskatchewan river, having in view the bettering of the run-off conditions of the river in the interests of the power developments along its course. These investigations have not yet been completed.

All field work was carried on by light reconnaissance parties, and with a minimum of expenditure. Stream measurement work was instituted and maintained with special reference to these power studies.

ALBERTA AND SASKATCHEWAN.

The power and storage investigations in Alberta and Saskatchewan have been carried on under the direction of Mr. C. H. Attwood as chief engineer. Mr. Attwood's full report (No. 7) is appended, and covers the work thoroughly.

Numerous applications for small water-powers throughout these two provinces have been received and dealt with during the past year. All such applications have been handled through personal inspection on the ground, it being the administrative

policy that an engineering inspection of all power projects is a necessary preliminary to further action by the department. Mr. Attwood has been enabled to give valuable assistance to prospective developers of small water-powers, both in respect to the amount of power to be anticipated, and in respect to the type of plant and class of construction best adapted to each particular site.

Applicants for the development of small water-powers are usually men of limited means, and count on personally doing the greater portion of the construction work. The small mills proposed, contemplate serving a local demand only. Any assistance furnished to such undertakings is of direct benefit to local industries, and is gladly welcomed by the settlers.

Saskatchewan River Storage.

The investigation into the storage possibilities in the Saskatchewan basin was continued. At the request of the municipal authorities of Prince Albert, a reconnaissance survey was made of the Red Deer and Montreal lakes, and of other lakes in the vicinity, for the purpose of determining the feasibility of diverting their run-off into the North Saskatchewan river. The unfeasibility of this proposal is fully set out in Mr. Attwood's report.

Other storage possibilities investigated on the ground were: Beaverhill lake, Gull lake, Jackfish lake, Kootenay Plains reservoir, and Brazeau lake. The results of the investigations gave little encouragement to the prospect of materially benefiting the winter flow of the Saskatchewan in its lower reaches.

Power Investigations.

A reconnaissance survey of the North Saskatchewan river from Prince Albert to the entrance of the Sipanok channel constituted the most important section of the power investigations. Six prospective power sites were examined, and are worthy of further study.

Other field studies were made throughout the two provinces, as covered in detail in Mr. Attwood's report. All field work was carried on by means of a small mobile party, keeping transport and general operative charges to a minimum.

The results and conclusions from the Bow River power and storage investigations have been published during the past year as "Water Resources Paper No. 2."

Recommendations for Future Work.

The following investigations are recommended as particularly pressing in the interests of efficient water-power administration in Alberta and Saskatchewan and Manitoba:—

(1) A reconnaisance survey of the storage lakes at the headwaters of the English river. The Winnipeg river power studies show that the date is not far distant when it will be necessary to resort to these lakes for storage in the interests of power undertakings on the Winnipeg river in Manitoba.

(2) A line of precise levels should be run along the power reach of the Winnipeg river in Manitoba, and a series of permanent bench-marks established.

(3) A reconnaissance power survey of the Grass and Burntwood rivers in northern Manitoba is advisable. Applications have already been received in the department for the right to develop power on the Grass river.

(4) A reconnaisance survey of the Bird river is necessary, power applications having been received on the same.

(5) The storage investigations in the headwaters of the Little Saskatchewan river should be continued.

(6) A reconnaissance of the Spray river with a view to ascertaining its possibilities in the way of power.

(7) An inspection and report on the past year's operation of the Minnewanka dam.

(8) A report on power possibilities on Carrot creek.

(9) A report on the possibilities of constructing a dam at the outlet of Bear lake.

(10) An inspection and report on the present status of the Fort Saskatchewan power plant.

(11) An inspection and report on the present status of the Cole falls dam.

(12) A reconnaissance survey of the North Branch of the North Saskatchewan river from Edmonton to Prince Albert.

(13) Reconnaissance power investigations in the Peace river district.

DU BONNET FALLS DEVELOPMENT.

Owing to the financial depression, active construction work on the Du Bonnet falls or Great falls project has not been pressed. However, the Winnipeg River Power Company, which has the rights of development at this site, has carried on aggressive field and office work, and detail designs of the entire project have been thoroughly worked out.

Departmental approval has been given to the general layout plans and governing features of the project. These features coincide entirely with the departmental scheme of development covering the entire reach of the river in Manitoba although the actual location of the plant is about one-half a mile below the first proposed layout. The Great falls development will form a component link in the general comprehensive power scheme.

The company has completed 12 miles of construction railway from the Lac du Bonnet branch of the Canadian Pacific railway to the site of development, and are prepared to rush construction work at the earliest feasible opportunity.

RECLAMATION.

Reclamation investigation and field study has been continued during the past year under Mr. T. H. Dunn as chief engineer. The investigation work was largely a continuation of the work of the preceding year, together with such inspection as was necessitated by the requirements of proper administration. Mr. Dunn's full report on the work carried on under his direction is appended hereunder (No. 9).

Reclamation study was chiefly centered in and connected with the Carrot River district, lake Winnipegosis, lake Manitoba, the Sumas Dyking and Drainage district, the Upper Columbia valley, and Silver creek.

Investigation by field party was required only in connection with the Carrot River district, the balance of the work being dealt with by inspection. The entire season's work was carried to a successful conclusion along the most economical lines, the field work being conducted with marked efficiency.

Recommendations for Future Work.

In the interests of questions and applications now before the Water Power Branch, additional study should be given to the following projects, more fully covered in Mr. Dunn's report:—

(1) A continuation of the Carrot River reclamation study is necessary in order to determine definitely the feasible scope of the project.

(2) The effects of, and what is involved in the lowering of lake Winnipegosis for drainage purposes should be further studied.

(3) Similar study should be given to the question of lowering lake Manitoba.

(4) A reconnaissance study of the district involved in the McLaren reclamation project should be undertaken.

General.

Panama Pacific Exhibit.

In the report of Mr. K. H. Smith (No. 8) appended hereunder will be found the details of the work undertaken by the Water-Power Branch in connection with the Panama Pacific exhibit, and the Winnipeg Industrial exhibit.

The water-power exhibit at the Panama Pacific Exposition was successfully installed in good time for the opening of the exposition. The exhibit, consisting essentially of a large topographic painting of Canada, 70 feet in length, and eleven models of representative water-power plants operating throughout the Dominion, has attracted widespread attention and has received much favourable comment. The striking survey which the exhibit supplies of the enormous water-power resources of Canada, aided by the publicity campaign which is being concurrently carried on, will undoubtedly result in increased activities in hydro-electric and power development throughout the Dominion.

Winnipeg Industrial Exhibit.

The exhibit illustrating the result of the power studies which have been carried to completion by the Water-Power Branch on the Winnipeg river in Manitoba, and which was referred to in last year's annual report, has been completed and successfully installed in the Winnipeg Industrial exhibit in Winnipeg. The exhibit consists of a landscape painting of the power reach of the Winnipeg river, locating the existing hydro-electric plants and the proposed concentrations which are designed to utilize the balance of the river fall available in Manitoba, together with a series of eight models of these plants, existing and prospective. The entire exhibit presents in a striking manner the results of the power conservation studies along the Winnipeg river, and has been greatly appreciated by the citizens of Winnipeg and of Manitoba generally, as illustrating the very thorough steps taken by the department towards the preservation from wasteful exploitation of the water-power resources of the province.

International Joint Commission.

The Lake of the Woods reference, with its vital bearing on the control of the surface of the Lake of the Woods, has involved a continuation of the extensive field and office studies which have been actively carried on during the past three years.

The value of the lake to the power interests can best be gauged by stating that properly installed regulation will increase the power available on the Winnipeg river below the lake from 266,000 to 471,000 horse-power, while no power regulation permissible on the lake will reduce the dependable output under present conditions to 145,000 horse-power. It is essential, therefore, that the Water-Power Branch should spare no effort to ensure a settlement of the regulation questions involved in the reference, in a manner favourable to the power interests involved.

The field work in connection with this reference has been largely confined to a careful study of the run-off from the lake, and to an accurate investigation into its past surface levels. The complicated conditions, both physical and artificial, which exist at the lake outlets has rendered the run-off studies particularly involved. Excellent results have, however, been secured.

The final hearing of the International Joint Commission in this connection is expected to take place at an early date, to prepare for which a large amount of work is yet required in the compilation and final consideration of the data gathered.

Co-operation with the Nova Scotia Water Power Commission.

The legislature of the province of Nova Scotia by an Act dated June 10, 1914, created the Nova Scotia Water-powers Commission for the purpose of investigating and reporting on the water-powers of the province. This commission was desirous of making some co-operative arrangement with the Dominion Government, looking to the study of the provincial power resources, it being considered that satisfactory co-operation would result in increased economy and efficiency, and would work to the advantage of all concerned.

Following correspondence on the matter, and conferences with the Hon. E. H Armstrong of the Nova Scotia Government, and with Prof. Howard Murray of Dalhousie University, representing the commission, and on the recommendation of the Commission of Conservation, it was decided that the Dominion Water Power Branch should co-operate with the commission to the extent of supplying the services of an engineer experienced in water-power work, and of furnishing him with the necessary equipment to properly carry on his field studies.

This arrangement was considered entirely satisfactory by the commission, and Mr. K. H. Smith, an experienced engineer of the Water Power Branch staff, was duly appointed to take charge of the field investigations.

A formal agreement defining the scope of work and the extent of the co-operation between the contracting parties has been drafted and will be ready for signature in the course of a few days.

It is anticipated that the practical results secured under the terms of the agreement will be of exceptional value both to the Dominion and to the province.

The season's work, both in the field and in the office, has been brought to a successful conclusion through the conscientious co-operation of the entire staff, and is in a large measure due to the exeellent organization and efficient management of the field offiees under the district and division engineers. It is with pleasure, therefore, that I take this opportunity of bringing to your attention the continuous and whole-hearted efforts of the field staff, and the satisfactory field investigations which have resulted during the year just closed.

I have the honour to be, sir,
Your obedient servant,

J. T. JOHNSTON,
Hydraulic Engineer.

No. 5.

REPORT OF R. G. SWAN.

VANCOUVER, B.C., March 31, 1915.

SIR,—I beg to submit the following short report of the work carried on by the British Columbia Hydrographic Survey for the fiscal year ending March 31, 1915.

SCOPE OF WORK.

The rapidly increasing settlement and development of British Columbia has created a constantly increasing demand for definite and trustworthy information in connection with water supply.

The area covered by the survey during the year lies mostly in the southern half of the province. Very little new territory was investigated owing to the scope of work being limited by the appropriation available.

The demand for hydrographic information from other parts of the province, which are rapidly developing, has become so great that it is sincerely hoped that during the coming year our investigations may be extended to include the territory along the Pacific Great Eastern, and the Grand Trunk Pacific railways.

Satisfactory co-operation has been effected with the superintendent of the British Columbia Lands Branch and with the Commissioner of Dominion Parks, the engineers of this staff reporting on all engineering work in the Dominion Railway Belt in connection with irrigation and drainage projects, foreshore applications for leases in connection with quarrying, the removal of sand and gravel, and marine docks and elevators. The question of municipal water supply and the best method of maintaining its freedom from pollution is also receiving attention, surveys being carried out for the setting aside of lands to ensure protection of the water supply for domestic use.

The Conservation Commission of Canada has been furnished with all the hydrographic data required in its forthcoming report on British Columbia water-powers. The furnishing of this data has involved a very considerable amount of extra work, not only in having additional copies of the data made available in the form desired by the commission, but also in having the various field officers of the survey carry on work incident to the particular requirements of the commission.

The co-operation between the Provincial Water Rights Branch and this survey has been extensive and of mutual value. In every case the provincial engineers have rendered every reasonable assistance to the engineers of this survey. Many valuable suggestions as to organization and scope of work have been received from the Comptroller of Water Rights, Mr. William Young, and have been incorporated in our work.

CONVENTIONS.

One of the greatest sources of inspiration and assistance to the work of this organization has been the conventions attended by representatives of the staff during the year. The chief engineer accompanied by the division engineer of the Nelson district, attended the convention of the Western District engineers of the Water Resources Branch of the United States, at Boise, Idaho, on January 27 to 30, 1914. This convention was of particular interest to this survey as it offered opportunities of arranging co-operative work with the district engineer of the Water Resources Branch for the state of Washington.

The chief engineer attended the annual conference of district engineers of the Water Resources Branch at Washington, D.C., in December. This conference was of particular value, offering opportunities of discussing, and adjusting, many difficulties that had arisen in both the field work and office computations. The methods, equipment, and organization of the American hydrographers are as complete as practical experience can make them. At the same time, alterations and additions with a view to improvement are constantly being made. As these are fully discussed before final acceptance at this annual convention, the Canadian engineers are afforded the advantage of learning both the good and bad phases of the American practice.

The International Irrigation Congress at Calgary in September was attended by the chief engineer and the division engineer at Kamloops, when an opportunity was taken to have a conference with the superintendent of the branch and the comptroller of water rights respecting the problems that have arisen between the Dominion and the province. The annual convention of the Western Canada Irrigation Association, held at Penticton, was attended by the division engineer of the Kamloops district. The chief engineer was appointed as a special delegate to represent the Canadian Society of Civil Engineers at this convention, but was unable to attend.

It is urged that every reasonable opportunity be afforded to members of this staff to attend similar conventions in the future, as there is no question as to the benefit derived from the associations made at these meetings.

ORGANIZATION.

In the writer's report for 1914 the methods used for collecting the hydrographic data, and the division of territory in the province covered by the survey, were fully discussed. As we are still following the same policy it is not necessary for me to again go into this in detail.

The regular staff for the year consisted of the chief engineer, three division engineers, nine assistant engineers, one accountant, two clerical assistants, and two stenographers. Two of the assistant engineers volunteered for active service with the Canadian forces, but as the season's work was well under way at the time they volunteered it was not necessary to fill the vacancies so caused.

Owing to the extent of country covered by the survey it was found to be more convenient and economical to divide it into three main divisions, with a division engineer in charge of each to generally supervise the work. The three divisions were subdivided into nine districts with an engineer in charge of each. These districts are as follows: Coast, Lillooet, Vancouver Island, Kamloops, Okanagan, Ashcroft, Nelson Revelstoke, and Cranbrook.

COAST DIVISION.

Southern District.—The following is a list of regular gauging stations:—

Station Number.	Name.	Location.
1000	Belknap	Tp. 6, R. 7, W. 7 M., Prov. Water Dist. 1.
1060	Black	Near Howe Sound, Prov. Water Dist. 1.
1063	Belknap	Tp. 7, R. 7, W. 7 M., Prov. Water Dist. 1.
1001	Boulder	Tp. 3, R. 27, W. 6 M., Prov. Water Dist. 1.
1002	Brandt	Tp. 7, R. 7, W. 7 M., Prov. Water Dist. 1.
1021	Brandt	Tp. 7, R. 7, W. 7 M., Prov. Water Dist. 1.
1023	Capilano	Near North Vancouver, Prov. Water Dist. 1.
1003	Chehalis	Tp. 4, R. 30, W. 6 M., Prov. Water Dist. 1.
1004	Chilliwack	Tp. 23, E. C. M., Prov. Water Dist. 1.
1066	Coquitlam	Tp. 38, W. C. M., Prov. Water Dist. 1.
1005	Coquihalla	Tp. 5, R. 26, W. 6 M., Prov. Water Dist. 1.
1007	Fraser	Tp. 5, R. 26, W. 6 M., Prov. Water Dist. 1.
1009	Hixon	Tp. 6, R. 7, W. 7 M., Prov. Water Dist. 1.
1064	Hixon	Tp. 6, R. 7, W. 7 M., Prov. Water Dist. 1.
1010	Jones	Tp. 3, R. 27, W. 6 M., Prov. Water Dist. 1.
1046	Lynn	Near North Vancouver, Prov. Water Dist. 1.
1011	Mesliloet	Tp. 7, R. 7, W. 7 M., Prov. Water Dist. 1.
1058	Nicolum	Tp. 4, R. 5, W. 6 M., Prov. Water Dist. 1.
1013	Norton	Tp. 7, R. 7, W. 7 M., Prov. Water Dist. 1.
1022	Seymour	Near North Vancouver, Prov. Water Dist. 1.
1017	Silver-Pitt	Tp. 4, R. 5, W. 7 M., Prov. Water Dist. 1.
1033	Slollicum	Tp. 5, R. 28, W. 6 M., Prov. Water Dist. 1.
1018	South Lillooet	Tp. 12, E. C. M., Prov. Water Dist. 1.
1065	Skagit	Four miles from international boundary, Prov. Water Dist. 1.
1056	Sumallo	Near Railway Belt boundary, Prov. Water Dist 1.
1057	Sumallo	Tp. 3, R. 24, W. 6 M., Prov. Water Dist. 1.
1020	Young	Tp. 7, R. 7, W. 7 M., Prov. Water Dist. 1.

Stations on Seymour, Capilano, and Lynn creeks have been established only recently at the request of the Waterworks department of the cities of Vancouver and North Vancouver. The data also are required by the comptroller of water rights in connection with the administration of that department.

The stations on the Skagit, Nicolum, and Sumallo rivers have been established in connection with a proposed development of the Canadian Northern Railway. The development in part includes a diversion from the Smallo (a tributary of the Skagit) into the Nicolum. Owing to the inaccessibilty of the station on the Skagit river, and the difficulty in securing a gauge reader, a Gurley self-recording gauge has been installed. The river is of considerable international importance, and the expenditure in connection with the establishment of a recording gauge was considered well warranted.

The station on the Coquitlam river at Port Coquitlam was established at the request of the city that this department co-operate in the construction of works to protect the riparian owners against floods from the Coquitlam river.

The great number of stations in this district have been established for three or four years, and are for the most part well rated. Winter conditions are very mild, and the open-water rating curve is applicable during the entire year.

C. G. Cline, B.A.Sc., D.L.S., was in charge of the work of this district.

Lillooet District.—The following is a list of regular gauging stations:—

Station Number.	Name.	Location.
1045	Bridge	Thirty miles from mouth, Prov. Water Dist. 1.
1048	Cayuse	Above Seton creek, Prov. Water Dist. 1.
1034	Cheakamus	One mile above mouth, Prov. Water Dist. 1.
1047	Fountain	Above irrigation ditches, Prov. Water Dist. 1.
1035	Green	Above Nairn falls, Prov. Water Dist. 1.
1041	Green	Below Green lake, Prov. Water Dist. 1.
1050	Laluwissin	Above irrigation ditches, Prov. Water Dist. 1.
1038	Lillooet	Six miles above Lillooet, Prov. Water Dist. 1.
1043	Riley	Above irrigation ditches, Prov. Water Dist. 1.
1049	Seton	Below Seton lake, Prov. Water Dist. 1.
1061	Six-mile	Near mouth, Prov. Water Dist. 1.
1037	Soo	One mile from mouth, Prov. Water Dist. 1.
1044	Texas	One mile from mouth, Prov. Water Dist. 1.

This is the only district in the Coast division in which irrigation is required, and with the exception of four stations all the streams in this district are being studied in this connection.

Bridge, Cheakamus, and Green rivers are being studied in connection with power possibilities, while there is a proposed scheme for reclaiming bottom lands in the valley of Lillooet lake by lowering the outlet of the lake.

H. C. Hughes, B.Sc., was in charge of the work in this district.

Vancouver Island District.—The following is a list of regular gauging stations:—

Station Number.	Name.	Location.
1032	Big Qualicum	One and one-half miles from mouth, Prov. Water Dist. 1.
1042	Campbell	At Campbell lake, Prov. Water Dist. 1.
1027	Chemainus	One mile from mouth, near Chemainus, Prov. Water Dist. 1.
1054	Cowichan	At Cowichan lake, Prov. Water Dist. 1.
1030	Englishman	One and one-half miles from mouth, near Parksville, Prov. Water Dist. 1.
1029	Haslam	Two miles from mouth, near Ladysmith, Prov. Water Dist. 1.
1026	Koksilah	Two miles from mouth, Prov. Water Dist. 1.
1031	Little Qualicum	At Cameron lake, Prov. Water Dist. 1.
1028	Nanaimo	Six miles from mouth, Prov. Water Dist. 1.
1040	Oyster	One mile from mouth, Prov. Water Dist. 1.
1036	Puntledge	One mile from mouth, Prov. Water Dist. 1.
1063	Puntledge	Diversion dam above Canadian Collieries power plant, Prov. Water Dist. 1.
1025	Shawnigan	At Shawnigan lake, Koenigs, Prov. Water Dist. 1.
1051	Sproat	At Sproat lake, Prov. Water Dist. 1.
1052	Stamp	At Great Central lake, Prov. Water Dist. 1.
1053	Stamp	Half mile above Stamp falls, Prov. Water Dist. 1.
1039	Tsolum	Three miles from mouth, near Courtenay, Prov. Water Dist. 1.

Stream measurements were started by this survey on Vancouver Island in May, 1914. Previous to this date the Provincial Water Rights Branch had done considerable work in establishing gauges and metering stations on most of the important streams in the more settled parts of the island. The hearty co-operation of the provincial

engineers in transferring the work was much appreciated. Seventeen stations were rated during the year. The Canadian Collieries, Ltd., supplied the data for one of these at their diversion dam on the Puntledge river. The Ritchie Agnew Company also supplied much valuable data on the Stamp river at Stamp falls. One very important new station was established on the Campbell river where a large development is contemplated by the Campbell River Power Company.

During the coming year we hope to more definitely define the rating curves for the stations already established, and if possible to extend the work to the west coast and northerly part of the island.

C. E. Webb, B.A.Sc., was in charge of the work of this district.

Southern District.—The following is a list of regular gauging stations:—

Station Number.	Name.	Location.
2002	Bolean	Tp. 18, R. 12, W. 6 M., Prov. Water Dist. 2.
2068	Boulder	Near Chu Chua, Prov. Water Dist. 2.
2004	Campbell	Tp. 19, R. 16, W. 6 M., Prov. Water Dist. 2.
2057	Canyon	Tp. 21, R. 15, W. 6 M., Prov. Water Dist. 2.
2047	Clearwater	Near Raft river, Prov. Water Dist. 2.
2056	Little Clearwater	Near Raft river, Prov. Water Dist. 2.
2005	Cherry	Tp. 19, R. 19, W. 6 M., Prov. Water Dist. 2.
2011	Essell	Tp. 17, R. 14, W. 6 M., Prov. Water Dist. 2.
2067	Fishtrap	Near Barriere Prov. Dist. 2.
2014	Guichon	Near Mamit lake, Prov. Water Dist. 3.
2019	Heffley (below Heffley Lake)	Tp. 22, R. 16, W. 6 M., Prov. Water Dist. 2.
2018	Heffley (Lower)	Tp. 22, R. 17, W. 6 M., Prov. Water Dist. 2.
2020	Ingram	Tp. 17, R. 13, W. 6 M., Prov. Water Dist. 2.
2022	Jamieson	Tp. 22, R. 17, W. 6 M., Prov. Water Dist. 2.
2023	Louis	Tp. 23, R. 15, W. 6 M., Prov. Water Dist. 2.
2026	Monte (Div. to Summit Lake)	Tp. 18, R. 14, W. 6 M., Prov. Water Dist. 2.
2025	Monte (below Div. to Summit Lake)	Tp. 13, R. 14, W. 6 M., Prov. Water Dist. 2.
2024	Monte (above Bostocks Div.)	Tp. 19, R. 15, W. 6 M., Prov. Water Dist. 2.
2069	Myrtle	Near Raft river, Prov. Water Dist. 2.
2032	Paul (below Paul L.)	Tp. 20, R. 16, W. 6 M., Prov. Water Dist. 2.
2055	Raft	Near Raft river, Prov. Water Dist. 2.
2058	Siwash	Tp. 22, R. 16, W. 6 M., Prov. Water Dist. 2.
2040	Thompson (Kamloops)	Tp. 20, R. 17, W. 6 M., Prov. Water Dist. 2.
2041	N. Thompson (above Jamieson Creek)	Tp. 22, R. 17, W. 6 M., Prov. Water Dist. 2.
2059	N. Thompson (above Clearwater river)	Near C.N.P. Mile 71, north of Kamloops, Prov. Water Dist. 2.
2043	Tranquille	Tp. 20, R. 19, W. 6 M., Prov. Water Dist. 2.
2066	Whitewood	Near Barriere, Prov. Water Dist. 2.

The majority of the stations in this district were established by the organization of the Railway Belt Hydrographic Survey when this survey was inaugurated in 1911. Owing to the scarcity of water in this district and the extensive use of irrigation, an endeavour has been made to make a close study on all contentious streams. In this connection this organization has co-operated closely with the Water Rights Branch of British Columbia, which is dealing with the very perplexing situation relative to water rights within the Railway Belt.

In addition to the stations maintained on the irrigation streams, new stations were established during the year on Myrtle and Raft rivers. These rivers, next to the Adams river, present the best power possibilities in the interior of the province.

E. H. Tredcroft, C.E., was in charge of the work in this district.

Okanagan Districts—The following is a list of the regular gauging stations:—

Station Number.	Name.	Location.
2000	Adams	Tp. 23, R. 12, W. 6 M., Prov. Water Dist. 2.
2065	Ashnola	Near Ashnola, Prov. Water Dist. 4.
2048	Boundary	At Greenwood, Prov. Water Dist. 5.
2050	Celeste	Near Albas, Prov. Water Dist. 2.
2051	Crazy	Tp. 23, R. 5, W. 6 M., Prov. Water Dist. 2.
2010	Eagle	Tp. 23, R. 6, W. 6 M., Prov. Water Dist. 2.
2064	Granite	Near Coalmont, Prov. Water Dist. 4.
2052	Kettle (N. Fork)	At Grand Forks, Prov. Water Dist. 5.
2045	Kettle (W. Fork)	Near Westbridge, Prov. Water Dist. 5.
2046	Kettle (Nicholson's Bridge)	Near Kettle Valley, Prov. Water Dist 5.
2049	Kettle (Carson)	At Carson, Prov. Water Dist. 5.
2031	Niskonlith	Tp. 21, R. 13, W. 6 M., Prov. Water Dist. 2.
2053	Okanagan	Near Fairview, Prov. Water Dist. 4.
2061	Seymour	Near Seymour Arm, Prov. Water Dist. 2.
2054	Similkameen	Near Ashnola, Prov. Water Dist. 4.
2034	Shuswap	Tp. 18, R. 9, W. 6 M., Prov. Water Dist. 2.
2063	South Similkameen	At Princeton, Prov. Water Dist. 4.
2068	Tulameen	At Coalmont, Prov. Water Dist. 5.
2042	Thompson (Chase)	Tp. 21, R. 13, W. 6 M., Prov. Water District 2.

Most of these stations were established during the year of 1914 but, with the exception of two, enough meterings were made to establish fairly accurate rating curves.

The stations on the Kettle river and its branches, and that on Boundary creek, were taken from the Nelson division, relieving somewhat the pressure on that staff. These stations can be worked very well from the Kamloops office, as they are not far off the course of the field man en route to and from the Similkameen valley.

The Similkameen, Tulameen, Seymour, Okanagan, and the Adams rivers are important potential sources of power. The last two mentioned are of particular interest; in both cases unlimited storage and a good head are easily obtainable. A development on the Okanagan river at Okanagan falls, a natural power site, would make possible the cultivation of thousands of arid acres in the Okanagan valley.

Ashnola creek is the source of supply for the irrigation system of the Keremeos Land Company, of Keremeos. Niskonlith creek is a contentious irrigation stream in the dry belt, flowing into the Thompson river about 30 miles from Kamloops.

The Adams River Lumber Company has a dam at the outlet of Adams lake, and the opening and closing of the gates during logging operations made the stage of the river so variable that in order to secure accurate records a Gourley recording gauge was installed. The power possibilities of this river well warrant the expenditure of installing this gauge.

The work in this district will be considerably extended and revised during the coming year.

K. G. Chisholm, B.Sc., was in charge of this district.

Ashcroft District.—The following is a list of the regular gauging stations:—

Station Number.	Name.	Location.
2001	Barnes	Tp. 20, R. 24, W. 6 M., Prov. Water Dist. 2.
2003	Bonaparte	Tp. 21, R. 24, W. 6 M., Prov. Water Dist. 2.
2007	Criss	Tp. 22, R. 22, W. 6 M., Prov. Water Dist. 2.
2006	Coldwater	At Merritt, Prov. Water Dist. 3.
2008	Deadman	Tp. 22, R. 22, W. 6 M., Prov. Water Dist. 2.
2012	Fraser (Lytton)	Tp. 15, R. 27, W. 6 M., Prov. Water Dist. 1.
2016	Hat (above Hammond's Diversion)	Tp. 19, R. 26, W. 6 M., Prov. Water Dist. 2.
2028	Nahatlatch (Upper)	Tp. 12, R. 27, W. 6 M., Prov. Water Dist. 1.
2027	Nahatlatch (Lower)	Tp. 12, R. 27, W. 6 M., Prov. Water Dist. 1.
2029	Nicola (Merritt)	At MerrittProv. Water Dist. 3.
2030	Nicola (Mouth)	Tp. 17, R. 25, W. 6 M., Prov. Water Dist. 3.
2037	Spius	Tp. 13, R. 23, W. 6 M., Prov. Water Dist. 3.
2039	Thompson (Spence's Bridge)	Tp. 17, R. 25, W. 6 M., Prov. Water Dist. 3.

The stations maintained in this district are the same as the previous year, no new stations having been established.

With the exception of the stations on the Nahatlatch, the Fraser, and the Thompson rivers, the stations are all maintained in connection with irrigation projects.

Winter measurements are taken only on the stations referred to above.

C. B. Corbould, B.A.Sc., was in charge of the field work in this district.

Nelson District.—The following is a list of the regular gauging stations:—

Station Number.	Name.	Location.
3057	Cariboo	Near Burton city, Prov. Water Dist. 6.
3024	Carpenter	Near New Denver, Prov. Water Dist. 6.
3025	Carpenter	Near Sandon, Prov. Water Dist. 6.
3004	Columbia (Castlegar)	Near Castlegar, Prov. Water Dist. 6.
3007	Columbia (Trail)	Near Trail, Prov. Water Dist. 6.
3066	Duncan	Near Howser, Prov. Water Dist. 6.
3027	Four Mile (below Mill)	Near Silverton, Prov. Water Dist. 6.
3028	Four Mile (above Intake)	Near Silverton, Prov. Water Dist. 6.
3070	Fry	Near Johnstone's Landing (12 miles from Kaslo) Prov. Water Dist. 6.
3071	Glacier	Near Howser, Prov. Water Dist. 6.
3031	Goat	Near Erickson, Prov. Water Dist. 6.
3029	Kaslo	Near Kaslo, Prov. Water Dist. 6.
3022	Kooskanax	Near Nakusp, Prov. Water Dist. 6.
3075	Kootenay	Near Bonnington falls, Prov. Water Dist. 6.
3076	Kootenay	Near Bonnington pool, Prov. Water Dist. 6.
3077	Kootenay	Near Nelson, Prov. Water Dist. 6.
3014	Kootenay	Near Glade, Prov. Water Dist. 6.
3068	Lardeau	Near Howser, Prov. Water Dist. 6.
3021	Nakusp	Near Nakusp, Prov. Water Dist. 6.
3017	Pend d'Oreille	Near Waneta, Prov. Water Dist. 6.
3026	Sawmill	Near New Denver, Prov. Water Dist. 6.
3018	Slocan	Near Crescent valley, Prov. Water Dist. 6.
3023	Wilson	Near Roseberry, Prov. Water Dist. 6.

The majority of the stations established in this district during the year have been in connection with the proposed reclamation of the lands known as Kootenay flats, lying between Kootenay Landing, B.C. (the southern end of Kootenay lake) and Bonners Ferry, Idaho. The proper consideration of this project will necessitate the

obtaining of a large amount of data relative to the discharge of Kootenay river into and its outflow from the lake, the rise and fall of the river at various points, and the rise and fall of the lake.

C. E. Richardson, B.A.Sc., was in charge of the field work in this district.

Revelstoke District.—The following is a list of regular gauging stations:—

Station Number.	Name.	Location.
3000	Akolkolex	Tp. 22, R. 1, W. 6 M., Prov. Water Dist. 8.
3001	Beaver	Tp. 29, R. 25, W. 5 M., Prov. Water Dist. 8.
3002	Blaeberry	Tp. 28, R. 22, W. 5 M., Prov. Water Dist. 8.
3003	Bugaboo	Near Spillimacheen, Prov. Water Dist. 8.
3051	Canyon	Tp. 25, R. 22, W. 5 M., Prov. Water Dist. 8.
3005	Columbia (Golden)	Tp. 27, R. 22, W. 5 M., Prov. Water Dist. 8.
3007	Columbia (Revelstoke)	Tp. 23, R. 2, W. 6 M., Prov. Water Dist. 8.
3035	Dutch	Near Fairmont Springs, Prov. Water Dist. 8.
3062	Field Springs (No. 1)	Tp. 28, R. 18, W. 5 M., Prov. Water Dist. 8.
3063	Field Springs (No. 2)	Tp. 28, R. 18, W. 5 M., Prov. Water Dist. 8.
3064	Field Springs (No. 3)	Tp. 28, R. 18, W. 5 M., Prov. Water Dist. 8.
3036	Findlay	Near Thunder Hill., Prov. Water Dist. 8.
3008	Horsethief	Near Wilmer, Prov. Water Dist. 8.
3053	Hospital (Weir)	Tp. 27, R. 22, W. 5 M., Prov. Water Dist. 8.
3010	Illecillewaet (Glacier)	Tp. 26, R. 26, W. 5 M., Prov. Water Dist. 8.
3009	Illecillewaet (Revelstoke)	Tp. 23, R. 2, W. 6 M., Prov. Water Dist. 8.
3030	Incomappleux	Near Beaton, Prov. Water Dist. 8.
3011	Kicking Horse (Golden)	Tp. 27, R. 22, W. 5 M., Prov. Water Dist. 8.
3012	Kicking Horse (Field)	Tp. 28, R. 18, W. 5 M., Prov. Water Dist. 8.
3013	Kicking Horse (No. 2 tunnel)	Tp. 28, R. 18, W. 5 M., Prov. Water Dist. 8.
3015	No. 2	Near Wilmer, Prov. Water Dist. 8.
3074	Salmon	Near Beaton, Prov. Water Dist. 8.
3034	Sinclair	Near Sinclair, Prov. Water Dist. 8.
3019	Spillimacheen	Near Spillimacheen, Prov. Water Dist. 8.
3060	Shuswap	Near Athalmer, Prov. Water Dist. 8.
3061	Stoddart	Near Athalmer, Prov. Water Dist. 8.
3020	Toby	Near Athalmer, Prov. Water Dist. 8.
3032	North Vermillion	Near Edgewater, Prov. Water Dist. 8.
3033	South Vermillion	Near Edgewater, Prov. Water Dist. 8.
3054	Washout	Near Galena, Prov. Water Dist. 8.
3055	Windermere	Near Windermere, Prov. Water Dist. 8.

The stations in this district in the Railway Belt were for the most part established in 1912 under the organization of the Railway Belt Hydrographic Survey. The study of weir stations on the Field spring was, however, only commenced in October, 1914. This work was begun at the request of the Dominion Parks Branch in connection with the proposed water supply for the town.

The stations on the rivers tributary to the Upper Columbia river are being maintained in connection with an application to reclaim the bottom lands along the valley between Spillimacheen and Golden.

Considerable hydrographic work had been carried on in the southern part of this district by the Water Rights Branch of British Columbia. The majority of the stations so established have since been transferred to this survey, and the assistance given in this work by Mr. Biker, of the Water Rights Branch, has been greatly appreciated.

J. A. Elliott, B.A.Sc., was in charge of this District.

Cranbrook District.—The following is a list of the regular gauging stations:—

Station Number.	Name.	Location.
3039	Bull	Near Bull river, Prov. Water Dist. 7.
3038	Cherry	Near Wasa, Prov. Water Dist. 7.
3048	Elk	Near Elko, Prov. Water Dist. 7.
3047	Gold	Near Newgate, Prov. Water Dist. 7.
3041	Kootenay	Near Wardner, Prov. Dist. 7.
3045	Linklater	Near Newgate, Prov. Dist. 7.
3037	Mark	Near Marysville, Prov. Water Dist. 7.
3056	Moyie	Near Kingsgate, Prov. Water Dist. 7.
3044	Mud	Near Elko, Prov. Water Dist. 7.
3046	Phillips	Near Roosville, Prov. Water Dist. 7.
3049	Rock	Near Baynes, Prov. Water Dist. 7.
3042	Big Sand	Near Jaffray, Prov. Water Dist. 7.
3043	Little Sand	Near Jaffray, Prov. Water Dist. 7.
3050	St. Marys	Near Wycliffe, Prov. Water Dist. 7.

The number of stations maintained in this district is not so large as we would wish, owing to the importance of the records in connection with irrigation for which the majority of the stations were established in 1914. Much time was devoted to these streams in order to obtain rating curves for the year. In this district, also, the transportation facilities are not good, many of the stations lying in isolated districts.

On the Elk river, which presents excellent power possibilities, a cable-car system was installed during the year for metering the stream.

Mr. D. O'B. Gill, B.Sc., was the engineer in charge of this district.

RECOMMENDATIONS.

Enlargement of Work.—A large number of inquiries have been made by engineers for run-off data on streams in the northern part of the province, and I would strongly recommend that the funds and staff be made available to extend the stream flow investigations to this part of the province.

Special Reports.—In connection with applications by the municipalities and towns in the Railway Belt, for the reservation of lands for the protection of the water supply, surveys are necessary to determine at all accurately the catchment basin of the river from which the water supply is received. To do this has required a great deal more time and money than can well be spared. I would recommend that in future these surveys be carried out as usual under the direction of the Surveyor General, but by a qualified member of this survey, and that the applicants for the reservation of the lands reimburse the department for the cost of the surveys.

Appreciation of the Staff.—This opportunity is taken by the chief engineer to extend his thanks and appreciation to the members of the staff for their loyal and conscientious co-operation which has made it possible to carry on a most successful and extensive season's work.

I have the honour to be, sir,

Your obedient servant,

R. G. SWAN,

Chief Engineer.

No. 6.

REPORT OF M. C. HENDRY.

WINNIPEG, March 31, 1915.

SIR,—I have the honour to submit the following report of the work carried on under my supervision by the Manitoba Hydrographic Survey for the year ending March 31, 1915.

ORGANIZATION AND SCOPE OF THE WORK.

The work of the Manitoba Hydrographic Survey, as organized in 1912, was successfully carried on during the past year. Extensions have been made from time to time as funds became available and necessity demanded, until at the present time discharge records are being obtained on all the large streams throughout the province.

The information gathered by the survey under the head of hydrographic work is obtained at a number of carefully located gauging stations. The selection of the sites for these stations is governed so far as possible by the local physical conditions. However, this is not always possible as the difficulty of obtaining a suitable gauge reader often affects the selection of the site. Those streams which are likely to be used in connection with reclamation of the land by drainage, or which may be a source of power, are given special attention. Efforts have been made to record the duration of the different stages of the rivers in order that as true a conception as possible of the regimen may be formed.

In addition to carrying on the regular stream measurement work, a reconnaissance of several rivers has been made with a view to determining their power and storage possibilities. The rating of two or three of the hydro-electric power stations in the province has also been undertaken and has necessitated detailing a member of the staff for this special work.

The work of collecting physical data in connection with the Lake of the Woods reference before the International Joint Commission, instituted in 1912, has been continued, and has required the continuous services of one member of the staff. In addition, the work of checking and compiling the great amount of data gathered has occupied the attention from time to time of various members of the office staff.

Considerable additional information relative to the Winnipeg river has been called for at various times in connection with power studies being made on that river, and this has also, at such times, required the services of some member of the staff.

Staff.

Mr. D. L. McLean, former chief engineer, resigned in October 1913. The work was thenceforth energetically carried on throughout the balance of the fiscal year by Mr. S. S. Scovil, assistant chief engineer. Mr. Scovil continued in active charge of the work until the month of June at which date the writer took charge, Mr. Scovil being transferred to head office in Ottawa and placed in charge of the run-off and storage studies undertaken by the Lake of the Woods Technical Board in connection with the Lake of the Woods Reference before the International Joint Commission. No other changes in the personnel of the staff has occurred, except in so far as it has been affected by the absence of several of the members on active military service.

The territory covered by the hydrographic work has been divided into districts, and an endeavour has been made to visit each station at least once a month. Messrs. Madden, Pirie, Smith, Allen, and Moore were principally engaged on this work.

Mr. S. C. O'Grady had charge of the work of collecting the physical data for the International Joint Commission, and was assisted in this work during the early part of the season by Mr. T. J. Moore.

A small party in charge of Mr. E. B. Patterson was at work on the Winnipeg river during the greater part of the summer, gathering various detailed information.

Mr. G. J. Lamb was placed in charge of the hydrographic work on the Nelson river, and established a metering station and gathered other important information in that district.

The office draughting staff was materially reduced through the enlistment of Messrs. P. J. Barry, E. B. Chalmers, and A. P. Smith for active service with various military organizations.

Mr. D. B. Gow was in charge of a small party investigating the Berens, Pigeon, and Bloodvein rivers. He was assisted by Mr. J. A. Page during the earlier part of the summer, and later by Mr. C. O. Allen.

LIST OF STATIONS.

The following are lists of the stations maintained by the survey. The first list is composed of those where regular discharge measurements are made and continuous records are obtained. In the second are listed those stations at which meterings have been secured but at which, for various reasons, no attempt has been made to secure continuous records. When the necessity arises, such records will be secured at these stations. In connection with this list of stations it should be pointed out that while at some of them continuous gauge records have been obtained, the discharge curves are not always sufficiently well defined to admit of daily estimates of discharge being made. The daily records are therefore omitted, and such stations are classed as miscellaneous. The third list contains those places at which gauge readings only are secured.

REGULAR METERING STATIONS.

File No.	Stream.	Location.
A.1.a	Assiniboine river	Brandon.
c	Assiniboine river	Headingly.
d	Assiniboine river	Millwood.
B.3.a	Brokenhead river	Sinnot.
B.4.a	Birdtail creek	Birtle.
L.1.a	Lake of the Woods	Kenora power-house.
L.1.b	Lake of the Woods	North Tunnel island.
		Keewatin River bridge.
c	Lake of the Woods	Norman Traffic bridge.
f	Lake of the Woods	Mill "A".
g	Lake of the Woods	Mill "C".
j	Lake of the Woods	C.P.R. Culvert, 1st, 2nd, and 3rd tunnels.
	Little Saskatchewan	Bilbey's bridge.
M.1.a	Manigotagan river	Wood falls.
M.4.d	Mossy river	Wilson's farm, Fork river.
N.1.e	Nelson river	Manitou rapids.
O.1.a	Ochre river	Ochre river.
P.2.b	Pinawa channel	Below Control dam.
R.1.a	Rat river	Otterburne.
R.4.a	Red river	Emerson.
R.4.f	Red river	Elm Park bridge, Winnipeg.
R.5.d	Roseau river	Below Dominion city.
R.6.a	Red Deer river	Hudsons Bay Junction, Sask.
S.1.a	Saskatchewan river	Head of Grand Rapids.
S.1.d	Saskatchewan river	Pas.
S.3.a	Shell river	Asessippi.
S.4.a	Souris river	Wawanesa.
S.6.a	Swan river	Swan river.
V.1.a	Valley river	Valley river.
W.1.a	Whitemouth river	Whitemouth.
W.6.d	Winnipeg river	Slave falls, above and below.
W.6.w	Winnipeg river	Whitedog falls, North channel.
W.6.w	Winnipeg river	Whitedog falls, South channel.

MISCELLANEOUS METERING STATIONS.

File No.	Stream.	Location.
A.1.b	Assiniboine river	Currie's Landing, Brandon.
B.1.a	Berens river	First falls, Berens river.
B.1.b	Berens river	Little Grand Rapids.
B.5.a	Bloodvein river	First falls.
E.1.b	English river	First falls.
E.2.a	Etomami river	Berens river.
F.1.a	Fairford river	Fairford.
F.2.a	Fork river	Fork river, Mossy river.
L.1.e	Lake of the Woods	K. L. & M. Co. Millrace, Keewatin.
L.1.k	Lake of the Woods	War Eagle outlet.
L.1.l	Lake of the Woods	Middle Lake outlet. (Garrett's narrows).
L.3.a	Little Saskatchewan river	Kirkham bridge.
L.3.b	Little Saskatchewan river	McKellar bridge.
L.3.c	Little Saskatchewan river	Minnedosa power plant.
L.3.d	Little Saskatchewan river	Riverdale.
L.3.e	Little Saskatchewan river	Five miles above Minnedosa.
M.3.a	Morris river	Morris.
M.4.b	Mossy river	Cameron's bridge.
M.4.c	Mossy river	Lacey's farm, below Fishing river.
P.2.a	Pinawa channel	Above Control dam.
P.2.c	Pinawa channel	W. E. S. R. Co. power-house.
P.4.a	Pigeon river	First (Sturgeon) falls.
R.4.b	Red river	Two miles below Emerson bridge.
R.4.d	Red river	Redwood bridge, Winnipeg.
R.5.a	Roseau river	Dominion city.
R.5.b	Roseau river	Baskerville's farm.
R.5.c	Roseau river	Mayne's farm.
R.6.c	Red Deer river	Erwood, Sask.
S.1.a	Saskatchewan river	Head of Grand rapids.
S.5.a	Squirrel creek	Austin.
S.7.a	Shoal river	Pelican rapids.
W.2.b	Whitemud river	Gladstone.
W.6.A	Winnipeg river	Minaki.
W.6.aa	Winnipeg river	"Dalles" rapids.
W.6.ab	Winnipeg river	Throat rapids.
W.6.j	Winnipeg river	Head of Grand du Bonnet falls.
W.7.a	Waterhen river	Lake Manitoba.

GAUGING STATIONS.

A.1.e	Assiniboine river	C.P.R. bridge, St. James, Winnipeg.
B.2.a	Bird river	Lac du Bonnet.
C.1.a	Cypress river	Cypress.
E.1.a	English river	Lac Seul.
J.1.a	Jack river	Norway house.
K.1.a	Kettle falls	Canadian channel.
K.1.b	Kettle falls	American channel.
L.1.d	Lake of the Woods	Norman dam—Headrace and tailrace.
L.1.h	Lake of the Woods	Western Outlet—Gauge No. 1.
L.1.m	Lake of the Woods	Ont. D. P. W. Lake Gauge (M.H.S.)
L.1.n	Lake of the Woods	Keewatin, Lake and River D. P. W. gauges.
L.1.p	Lake of the Woods	Automatic gauge at Kenora.
L.2.a	La Salle river	La Salle.
M.2.a	Manitoba lake	Meadow Portage.
M.2.b	Manitoba lake	Oak Point.
M.2.c	Manitoba lake	Delta.
M.4.a	Mossy river	Clendenning bridge, Lake Dauphin.
N.1.a	Nelson river	Norway house.
N.1.b	Nelson river	East Branch, Sea falls.
N.1.c	Nelson river	West branch, Whisky Jack Portage.
N.1.d	Nelson river	Warren's landing.
N.1.e	Nelson river	Manitou rapids.
P.1.a	Pembina river	La Riviere.
P.2.d-n	Pinawa channel	A, B, C, D intake and diversion dams.
P.3.a	Pipestone creek	Cromer.
P.4.b	Pigeon river	Outlet of Family lake.

GAUGING STATIONS—*Concluded.*

File No.	Stream.	Location.
R.2.a	Rainy river	Beaudette.
R.2.b	Rainy river	Emo.
R.2.e	Rainy river	International falls, Fort Frances.
R.3.a-u	Rainy Lake Feeders	Rainy lake.
R.4.c	Red river	St. Agathe.
R.4.e	Red river	Morris.
R.4.g	Red river	Agricultural College, Winnipeg.
S.1.b	Saskatchewan river	Lake Winnipeg.
S.1.c	Saskatchewan river	Foot of Grand rapids.
S.2.a	Seine river	St. Anae des Chenes.
T.1.4	Tye creek	Winnipeg river, below Slave falls.
W.1.b	Whitemouth river	Head of falls, above mouth.
W.2.a	Whitemud river	Westbourne.
W.3.a	Whiteshell river	Jessie lake.
W.4.a	Winnipegosis lake	Winnipegosis.
W.5.a	Winnipeg lake	Winnipeg beach.
W.6.ac	Winnipeg river	Below Old Fort island.
W.6.ad	Winnipeg river	Below Whitemouth river.
W.6.ae	Winnipeg river	Foot of 2nd McArthur falls.
W.6.af	Winnipeg river	Foot of Little du Bonnet falls.
W.6.b	Winnipeg river	Point du Bois.
W.6.c	Winnipeg river	Hunt Club landing.
W.6.e	Winnipeg river	Head of 4th falls, Seven Sisters.
W.6.f	Winnipeg river	Foot of Seven Sisters.
W.6.g	Winnipeg river	Winnipeg City Tramway bridge.
W.6.h	Winnipeg river	Foot of 1st McArthur falls.
W.6.k	Winnipeg river	Head of Little du Bonnet falls.
W.6.l	Winnipeg river	Head of Whitemud falls.
W.6.m	Winnipeg river	Head of Silver falls.
W.6.n	Winnipeg river	Foot of Silver falls.
W.6.o	Winnipeg river	Head of Pine falls.
W.6.p	Winnipeg river	Foot of Pine falls.
W.6.q	Winnipeg river	Fort Alexander.
W.6.r	Winnipeg river	Head of Seven Sisters.
W.6.s	Winnipeg river	Between 1st and 2nd Falls, Seven Sisters.
W.6.t	Winnipeg river	Between 2nd and 3rd Falls, Seven Sisters.
W.6.u	Winnipeg river	Foot of 3rd falls, Seven Sisters.
W.6.v	Winnipeg river	Foot of 4th Falls, Seven Sisters.
W.6.x	Winnipeg river	Gustafson's farm, Lac du Bonnet.
W.6.y	Winnipeg river	Rapids at B.-M. No. 161, Lac du Bonaet.

OFFICE WORK.

The work of checking, computing and filing the various data relating to stream flow involves a considerable amount of work. The general routine is as follows: The gauge readers return their readings, taken from their gauge books, on weekly cards; these are filed and the readings entered on gauge sheets in the gauge book. At the end of each month the gauge readers return their gauge books, which are also filled, and the readings as entered from the gauge cards on the gauge sheets are checked and then entered upon the discharge sheets.

The notes of the meterings are also returned to the office and filed after being checked. The discharges are first computed to the standard meter rating, afterwards being corrected at the time of checking for the special rating of the meter. From the meterings, discharge mean velocity and area curves are constructed, and from each discharge curve a rating table is compiled giving the discharge for the different gauge heights for intervals of one-tenth of a foot over the observed range in stage.

From the rating table the discharge is entered on the daily discharge sheet opposite the gauge height observed for each day. From the discharge sheet, the maximum, minimum, and mean daily discharges for each month are obtained, and the discharge per square mile of drainage area, also the run-off depth in inches and the total run-off in acre-feet is computed for the station.

During former winter seasons, except at those stations to which the open-water rating curve would apply, the gauge heights were as a rule observed only once a week. The estimate of mean monthly run-off was based upon these, and no attempt made to arrive at the daily discharge. During the past winter season, daily gauge heights were taken and, as in the past, the temperature, thickness of the ice, etc., were also observed. From a study of these data, coupled with the discharge measurements, it has been possible to obtain a fairly well-defined discharge curve for a number of the stations. By the use of these curves the daily discharges under winter conditions have been estimated.

During the past year the whole data gathered since the inception of the work have been re-arranged and checked and the results will be published in Water Resources Paper No. 4 now in course of preparation. This will be the first Stream Measurement Progress Report of the Manitoba Hydrographic Survey, and will cover the period 1912-13-14.

FUTURE WORK.

The work in the future will largely consist in carrying on that already instituted, but particular attention will be given to the smaller streams and creeks. Up to the present attention has been confined (as far as continuous records are concerned), to the more important streams, but there is undoubtedly a great necessity for information respecting the smaller streams and creeks especially those of intermittent flow. It is contemplated that a number of these will be investigated during the coming year and a start made on the study of their regimen.

The method that has been applied during the past winter season in arriving at the discharge from day to day will be extended, and further studies made along the line indicated. This field is one offering considerable scope for investigation, and commands the attention of all interested in stream measurement work. The laws governing the flow of water in open channels are fairly well understood, but the complications arising from low temperatures entirely alter the conditions and necessitate individual study. One of the difficulties experienced is that of observation. The cost of the work and difficulty of securing the right kind of observer tends to restrict the data upon which conclusions are based.

Further studies of the storage question on the English and Winnipeg rivers are necessary, especially on the former. The English River basin comprises approximately one-half of the drainage area tributary to the Winnipeg above the junction of the two rivers. It is therefore of great importance from the standpoint of storage.

POWER AND STORAGE INVESTIGATIONS.

During the past year investigations have been made of the power and storage possibilities of several rivers, including the Berens, Pigeon and the Bloodvein rivers, all flowing into lake Winnipeg from the east. Some work was also done during the year at the headwaters of the Little Saskatchewan river, with a view to ameliorating the operating conditions of the hydro-electric plant at Minnedosa. Work was also done on the Winnipeg river. On the English river some investigations were instituted, which were, however, confined almost entirely to the selection and location of a suitable metering station at which records of the discharge of that river could be obtained. Up to the present the discharge has been obtained inferentially, the run-off records on the Winnipeg as obtained at the Lake of the Woods outlets and below Point du Bois being utilized as the basic data. Owing to the lake-like expanses which occur on the river between these gauging stations, and also to the interference caused by storage in the Lake of the Woods, the daily variation in flow on the English river cannot be as closely estimated as might be wished.

BERENS AND PIGEON RIVERS.

There are a number of rivers entering lake Winnipeg from the east, which drain that territory north of the Winnipeg River basin and south and west of the district directly tributary to Hudson bay. Among the more important of these are the Manigotagan, Bloodvein, Pigeon, and Berens rivers. The country thus drained is rugged and rocky, and is covered more or less by growths of poplar, birch, spruce, and jack pine. The rivers are interrupted at frequent intervals by falls and rapids formed by outcropping rock ridges which stretch across the country in a northerly and southerly direction. Owing to the favourable power opportunities offering from these characteristic features, the rivers were investigated with a view to determining the extent and general scope of their power prospects. Mr. D. B. Gow was placed in charge of a small party, consisting of an assistant, a cook, and three canoemen, with instructions to gather the necessary information for the above purpose on these rivers.

The investigations on the Berens river included a track survey of the river, and a profile and a detailed survey at each of the rapids or falls where power development might be undertaken. A log and compass survey was made of the lakes with a view to approximately determining their areas; the outlets were examined and the sites of possible control dams surveyed. These surveys of the river and lakes were rendered necessary by the fact that the river lies almost wholly within unsurveyed territory.

In addition to these surveys, a number of meterings were made and a station at which daily gauge readiugs may be obtained was established at the head of Little Grand rapids near the head of Family lake. With this as a basis, a fair estimate may be made of the discharge of the Berens and Pigeon rivers.

On the Berens it was found that the total fall from Family lake to the mouth is 272 feet; of this fall approximately 195 feet, including the fall at Little Grand rapids, may be utilized for power purposes.

The situation obtaining with respect to the Berens and Pigeon rivers is rather peculiar. Both these rivers flow out of Family lake, and in consequence the drop between that lake and lake Winnipeg is the same for each, 272 feet. The Pigeon river was also examined last year, both rivers being investigated by the same party and the same methods were employed in each case.

In the case of the Pigeon river it was found that 220 feet of the 272 feet fall available can be utilized. The nature of the surrounding country precludes the possibility of any high head developments, and the distance between falls and rapids rather militates against the combining of several falls by means of a pipeline.

There are five possible sites at which power may be developed on the Berens, the heads varying between 25 and 47 feet. On the Pigeon river there are ten sites at which it appears possible to develop power, the maximum head capable of being developed being 32 feet. In addition to these power sites the combined flow of these two rivers might be made use of by a development at Little Grand rapids, with a head of 26 feet.

Storage may be secured on Family lake, and at present continuous records are being obtained of the discharge into that lake at Little Grand rapids. In order that some idea of the low-water conditions might be reached, an engineer of the survey visited the station and secured measurements in March, 1915. Meterings were also secured on each river near the mouth.

From a study of the records available, it appears that of the two, the Pigeon river has the greater discharge, having roughly two-thirds the total discharge from Family lake. Consequently, from a power standpoint, this river has the greater value. Though the records are not extensive, and estimates made at present may be considerably modified when more run-off data are available, it appears reasonably certain that approximately 16,000 horse-power can be developed on the Pigeon river.

and about 7,800 horse-power on the Berens. These figures may be somewhat increased by the creation of storage on Family lake, but no figures covering this feature are at present available. A full report dealing with the power possibilities on these rivers is now in course of preparation.

BLOODVEIN RIVER.

The Bloodvein river was also investigated during the past summer season by Mr. Gow's party. The methods followed were similar to those used on the Berens and Pigeon rivers. The total fall in the river was determined, and possible power and storage sites were investigated. The total fall in the river between the mouth and the branch flowing from Sasaginnigak lake is 150 feet in a distance of 69 miles, and the minimum recorded flow obtained in March, 1914, was 320 c.f.s. A report on this river is now being prepared and, when compiled, fuller details will be available.

LITTLE SASKATCHEWAN RIVER.

Early in the year a conference was held between representatives of the Dominion Water Power Branch, the Manitoba Hydrographic Survey and the power users on the Little Saskatchewan, with a view to reaching an equitable solution respecting the regulation of the river. It was agreed that the Manitoba Hydrographic Survey should undertake the study of the situation, obtain the necessary data and erect a control structure at one of the lakes with a view to giving temporary relief to the power users.

A dam was accordingly erected at the outlet of Clear lake, and the whole drainage basin was examined for reservoir sites. Stream-flow data were also gathered at several points in the basin. Owing to the extreme low-water conditions that obtained last summer and fall, the run-off from this basin was very small and, in consequence, the information gathered was rather of a negative character. The benefit resulting from placing the dam at the outlet of Clear lake was rather hard to determine, as notification of the manipulation of the dam was not given by the company officials who undertook that work, and as a result records were not made of the height of the water in the basin when the dam was opened or closed.

During the coming year, more definite information will be secured and the situation studied in more detail. The work contemplated will involve a complete study of the hydrography of the basin. In order that the low-water situation may be somewhat relieved, the erection of some temporary structures to create storage in several possible basins will be undertaken. When more definite information is to hand regarding the run-off, etc., recommendations will be made covering the regulation of the stream in the best interests of those concerned.

The question is of vital importance, as considerable invested capital is involved. During the last winter season, 1914-15, the plant of the Minnedosa Power Company was forced to close down owing to low water. The necessity of correcting these conditions as far as possible is therefore at once evident.

WINNIPEG RIVER.

During the summer of 1914, a small party under the direction of Mr. E. B. Patterson carried on certain work on the Winnipeg river. This consisted mainly in connecting up contours located in previous surveys and running them out at critical points so as to definitely determine the extent of country liable to flood under given conditions; other information of a like nature was also obtained. In addition to this work, Mr. O'Grady made various surveys around the Lake of the Woods outlets, at Throat rapids, and Whitedog rapids. He investigated part of the English river near the month with a view to locating a permanent metering section. The results of the work carried on by these two officers were returned to this office, where they were plotted up and filed

NELSON RIVER.

Reports covering various phases of the Nelson river and the vicinity have appeared at various times and have aroused public interest. The river has therefore demanded special attention.

With its immense drainage area and heavy run-off, and with a natural fall of approximately 700 feet, the power possibilities of the river are of exceptional importance. In the past, estimates of the possible power output of the river have been made from time to time, and while based upon fairly accurate information in so far as the drop available was concerned, were dependent upon very insufficient data in respect to the run-off. Such isolated measurements as were available had been secured during the open-water season, and gave little indication of the low winter flow to be anticipated. Power estimates were therefore somewhat undependable, and definite run-off data at all seasons were essential.

The fact that the country is being opened up by the Hudson Bay railway has been of great assistance to the gathering of data relative to the discharge of the river, and during the last year an effort was made to secure continuous records. Mr. G. J. Lamb, an engineer of the survey, was detailed for the work in the spring, with instructions to examine the river from the lake outlets down and to select a suitable metering section at some point on the river, as easy of access as possible and where the services of a gauge reader could be secured. Mr. Lamb located a suitable section, and started work toward the end of June. The site selected is located about 4 miles above Manitou rapids near the Hudson Bay railway, where advantage can be taken of that road in going in and out. The section was developed, slope gauges established and read daily, and a number of meterings were taken between the end of June and freeze-up. Little could be done following that time until after the new year, so Mr. Lamb returned to the office, having stored his outfit at the station. In January, Mr. A. Pirie was sent out to continue the work under winter conditions. The minimum flow recorded, as a result of this work, is less than previously estimated, so that earlier power estimates will need considerable revision.

The location of the station presented considerable difficulty, as may be realized from the following figures: width of section, 900 feet; maximum depth, 69 feet; and mean depth for the section, 35 feet. Owing to the impossibility of erecting a cable station, a boat station has been used, and the erection of this station formed no small part of the season's work. It was necessary to place anchorages at intervals across the river to which were attached floats supporting the stay line for the boat.

During the open-water season a considerable number of meterings were taken over a 1-foot range in river stage, but on account of wind effect it has not up to the present been possible to define a discharge curve for the station. Under winter conditions a further study was made. This included slope measurements (back-water effect being noticeable), vertical velocity measurements, and a determination of flow by the two-point method. In addition, soundings were taken through the ice to locate, if possible, a more suitable metering section. The conclusion reached was that the site selected was the best in the vicinity. The great drawback to the present station is the difficulty of maintaining it during the winter season, since all boat anchorages are lost each year.

The Hudson Bay railway will cross the river near the Manitou rapids, and it is hoped that a permanent station may be secured at that point. If this can be done, it is proposed to rate the station and install an automatic gauge.

It is of the greatest importance that continuous records be secured of the discharge of this river, as it is one of the largest on the continent, and, although some time may elapse before it is utilized for power purposes, the magnitude of its resources will bring it increasingly to the public attention from year to year.

THE INTERNATIONAL JOINT COMMISSION REFERENCE.

The work in connection with the Lake of the Woods reference before the International Joint Commission was instituted in 1912, and has been carried on continuously since that date. The nature of the reference has been discussed in previous annual reports, and need not be referred to in detail here.

The reference is as follows:—

1. In order to secure the most advantageous use of the waters of the Lake of the Woods and of the waters flowing into and from that lake on each side of the boundary for domestic and sanitary purposes, for navigation and transportation purposes, for fishing purposes, and for power and irrigation purposes, and also in order to secure the most advantageous use of the shores and harbours of the lake and of the waters flowing into and from the lake, is it practicable and desirable to maintain the surface of the lake during the different seasons of the year at a certain stated level; and if so, what level?

2. If a certain stated level is recommended in answer to question No. 1, and if such level is higher than the normal or natural level of the lake, to what extent, if at all, would the lake, when maintained at such level, overflow the lowlands upon its southern border, or elsewhere on its border, and what is the value of the lands which would be submerged?

3. In what way or manner, including the construction and operation of dams or other works at the outlets and inlets of the lake, or in the waters directly or indirectly tributary to the lake or otherwise, is it possible and advisable to regulate the volume, use, and outflow of the waters of the lake so as to maintain the level recommended in answer to question No. 1, and by what means or arrangement can the proper construction and operation of regulating works, or a system or method of regulation, be best secured and maintained in order to ensure the adequate protection and development of all the interests involved on both sides of the boundary, with the least possible damage to all rights and interests, both public and private, which may be affected by maintaining the proposed level?

It is of very great importance to the present and possible future power developments at the outlets of the lake and on the Winnipeg river, that the level of the Lake of the Woods be properly regulated. By the use of the lake as a storage basin the continuous power output of the river below can be increased from 266,000 horse-power to 471,000 horse-power, while if no regulation of any kind were permitted, that is if the lake was kept at one level, the total continuous power output of the river would be reduced to approximately 145,000 horse-power.

Owing to the broad nature of the questions involved in the reference, and to the great amount of physical data necessary to their proper consideration, it has been necessary to divide the work of collecting the essential data between the different organizations affected. To the Manitoba Hydrographic Survey was allotted the collation of the run-off, surface level, and physical data relating to the outlets of the Lake of the Woods and vicinity. This work had already been instituted by the survey in connection with the power studies on the Winnipeg river, so that when the reference became an issue it was only necessary to amplify and extend it to meet the new requirements.

Owing to the almost continual changes in governing conditions, the work of collecting the necessary data has been complicated. It has been necessary to secure a continuous series of meterings at each of the control points. The different power plants have been rated and checked from time to time, surveys have been made of the

outlets, and gauges have been set and read. The whole effort has been to secure as complete a record as possible of the range in stage and discharge, and the factors governing the same above and below the outlets.

The work was continued throughout the year, and the data gathered have been submitted from time to time to the consulting engineers of the International Joint Commission.

REPORTS.

Reports, together with maps, photographs, and all pertinent information, have been submitted to Ottawa dealing with the investigations of the previous year on the Manigotagan, Mossy, Fairford, Little Saskatchewan, and other rivers. From time to time various reports dealing with other matters coming under the work of the survey have been submitted by members of the staff detailed for the work. These are on file and available for reference.

CONVENTIONS.

During the past year the undersigned attended two important conferences, the International Irrigation Congress held in Calgary in October being of particular interest.

Owing to the close relation between irrigation and water-power interests in the West, especially near Calgary, the writer, from his connection with the power studies, was asked to prepare a paper for presentation at the congress, covering the "Storage and Power Possibilities on the Bow river west of Calgary." This paper was prepared and read by the writer, and is being published in the proceedings of the congress.

A second convention attended by the writer was that of the engineers of the Water Resources Branch of the United States Geological Survey, held in Washington in December. The wide range of experience obtained by these engineers in the course of their stream measurement work throughout all portions of the United States, and covered in the various papers presented at the conference, rendered the deliberations and discussions more than usually profitable to all interested in this class of investigation. The time spent in Washington in attendance on this convention was well repaid in the exchange of ideas which was thereby rendered possible.

During February a conference of the engineers of the Irrigation Branch was held in Calgary, at which Mr. Ireland represented the Manitoba Hydrographic Survey.

EVAPORATION STATIONS.

Two evaporation stations have been maintained, one at Kenora on the Lake of the Woods and one at Winnipeg Beach on lake Winnipeg. The latter was placed in commission about the 1st of August, and both were operated until freeze-up. Evaporation readings were taken twice daily, and records were kept of the temperature, the precipitation, and the direction of the wind. Both of these stations record the evaporation from water surface, the pans supported by small rafts being placed as near water level as possible.

There is great need of evaporation records in connection with storage studies, although so far this field of observation has been greatly neglected in this country.

Arrangements have been made with the Meteorological Service for the establishment of a meteorological station at the Winnipeg Street Railway's plant on the Pinawa channel. The Manitoba Hydrographic Survey proposes at the same time to establish an evaporation station at the same point, the officials at the plant having kindly consented to undertake the operation of the station.

AUTOMATIC GAUGES.

There has been a pressing need for automatic gauges in connection with the securing of run-off records. In a number of places where accurate daily discharge records are of prime necessity, it has been found difficult to secure the services of a gauge reader. Again, the mere securing of run-off or other records based upon gauge readings taken once or even twice a day, does not always represent the true conditions. Not only does fluctuation in the streams occur from day to day, but the hourly variation due to many governing conditions is often considerable. In other cases it has only been possible to secure the services of an observer to read the gauge at intervals of once a week or once a month.

Any estimates of discharge based upon gauge readings taken at such long intervals are necessarily liable to great error. In the case of a stream where there is a great fluctuation from day to day, the daily discharge based upon one or two readings may very easily be considerably in error. Under such circumstances the installation of some form of automatic gauge is essential.

The use of automatic gauges is, however, not without its drawbacks, the effect of frost being one of the great difficulties in connection with their operation. In fact it is the opinion of many that their use under frost conditions is impossible.

The question of insulating these gauges against low temperatures has been very carefully considered, and one has already been installed and operated under severe winter conditions. This gauge was placed on one of the public docks at Kenora and records the changes in the level at the Lake of the Woods. Considerable care was exercised in the design and construction of the gauge house and float well, in order that variation in temperature would be reduced to a minimum.

Two types of gauges are being used, the Gurley automatic printing gauge and the Gurley seven-day water-stage register. The Gurley automatic printing gauge records the water level every fifteen minutes to hundredths of a foot. One advantage of this particular type is the length of record that may be obtained. The gauge will operate from a month to six weeks without requiring any attention. The Gurley seven-day register as its name implies, gives a seven-day record, the changes in water stage being graphically recorded by a line drawn on a sheet of paper. By exercising care in locating these gauges at strategical points, reliable continuous records will be ensured, covering contentions and important questions now before the Water Power Branch.

EXTENSION OF INVESTIGATIONS.

Further surveys should be undertaken during the coming year, covering new fields as well as extending the old work. Under new work should be the investigation for power of some of the rivers in the vicinity of the Hudson Bay railway. It is understood that application has already been made for power rights on certain rivers in this district. The rivers of particular importance are the Grass and the Burntwood, both streams are of considerable magnitude, and are tributary to the Nelson. On the maps which are available, a number of falls are indicated, while the total drop between the various lakes is considerable. A power reconnaissance survey of these rivers might be undertaken at comparatively little expense, since, owing to the proximity of the railway and the canoe routes available, the cost of transportation, one of the large items involved, would be a minimum. Such a reconnaissance would make available the information necessary to the proper consideration of applications for power privileges. The information required for this administration consists mainly of: the drop at the different falls or rapids, the height and character of the banks of the river at these points, the nature of the river bed, the depth of water, the possibility of concentrating a series of falls or rapids in one development, and the probable maximum, minimum, and

mean discharge. This last information can only be obtained gradually. However, the extension of the regular stream measurement operations to include this district, will be undertaken from time to time as opportunity permits.

Under the head of extension of old work should be placed the investigation of the English river. The study of the Winnipeg river along power and storage lines would not be complete without some investigation of the English river. This should be undertaken during the coming season, the more pressing work required being an examination of the shores of lac Seul, a careful survey of the outlet and of any other point at which the water might be controlled, and the gathering of such information as would complete the studies on the Winnipeg river.

One phase of hydrographic work that so far has been left in abeyance is the study of the underground water supply of the province. It has been recommended that this work be taken up, since the necessity for definite information regarding the same is already pressing in some parts of the province, owing to the scarcity of an adequate and wholesome domestic water supply. The work involved and the staff necessary for its proper carrying out is given in the annual report, 1912-13. The low-water conditions recently experienced, and the probable repetition of these emphasizes the necessity of beginning this work at an early date. It is therefore recommended that the investigation of the underground waters of the province be undertaken this coming year. In order that the work may be carried out comprehensively, the services of a geologist should be secured, and arrangements made for obtaining analysis of water samples as they are secured.

In submitting this report, I wish to call to your attention the hearty co-operative spirit which has characterized the work of the staff. The organization was taken over at the beginning of the fiscal year by the undersigned, a stranger to practically all of the members, and the report would not be complete without a reference to their loyal support.

I have the honour to be, sir.
Your obedient servant,

M. C. HENDRY,
Chief Engineer.

No. 7.

REPORT OF C. H. ATTWOOD.

OTTAWA, March 31, 1915.

SIR,—I have the honour to submit the following as a report of the work carried on under my supervision during the year ending March 31, 1915.

The work consisted of a reconnaissance inspection of the Saskatchewan river from Prince Albert to Sipanok channel, a distance of 173 miles; of an examination into possible storage basins along the North Saskatchewan river, and the inspection of power sites for which applications had been filed. In carrying out this work I had two assistants, Messrs. Bissett and Hogarth. Owing to the nature of the work and the extent of the territory to be covered during the season, it was not felt that a larger organization was warranted.

The work accomplished during the season was as follows:—

1. Investigation of storage possibilities of Beaverhill lake, Alberta.
2. Investigation of the new Rocky Rapids power site on the North Saskatchewan river, Alberta.

3. Investigation of two sites for small water-powers on Shining Bank creek, Alberta.

4. Investigation of the storage possibilities of Gull lake, Alberta.

5. Investigation of the storage possibilities of Jackfish lake, Saskatchewan.

6. Investigation of the storage possibilities of Red Deer and Montreal lake, Saskatchewan.

7. Investigation of the power possibilities of the Saskatchewan river between Prince Albert and Sipanok channel, Saskatchewan.

8. Investigation of the storage possibilities on Kootenay Plains, North Saskatchewan river, Alberta.

9. Investigation of the storage and power possibilities of Brazeau lake and river, Alberta.

10. Investigation of power possibilities of Red Deer river at the Canyon site, Alberta.

11. Investigation for small water-power on Flat creek, Alberta.

12. Investigation for small water-power on Prairie creek, Alberta.

13. Investigation of two sites for small water-powers on Medicine river, Alberta.

14. Investigation of power possibilities of the Southfork river, Alberta.

15. Investigation of Bow river in Calgary for power.

16. Investigation of small water-power on Kneehill creek, Alberta.

BEAVERHILL LAKE.

Beaverhill lake is situated in townships 50, 51, 52, 53, ranges 17 and 18, west of the 4th meridian, and is easily reached from Tofield, a small town on the Grand Trunk Pacific railway, about 45 miles east of Edmonton.

The lake was examined with a view to its utilization as a storage basin to augment the low winter flow of the North Saskatchewan river.

The lake has an area of approximately 75 square miles, and a drainage area of about 460 square miles. The surrounding country is chiefly prairie, and the shores of the lake are, for the most part, low and flat. The lake was visited just after a period of heavy rainfall, and large areas of land surrounding the lake were found to be saturated with water, the lands being low and the drainage very poor. Only five creeks were observed flowing into the lake, four of these being on the west side and one at the south end of the lake. It was learned that these creeks are full only after heavy rains, and that the flood condition only lasts a very short time.

At the outlet of the lake, and extending for several miles to the north, the land is low and flat. Beaverhill creek meanders through these flats with no perceptible current; it is, in reality, nothing more than a series of small sloughs, and has been known to go dry during very dry seasons.

The only estimate of the discharge from Beaverhill lake is one obtained on Beaverhill creek near Chipman, on the Canadian Northern railway, by Mr. Whyte of the Irrigation Branch. At that time, July, 1912, the flow was estimated to be 22 c.f.s.

Under such conditions, the idea of storage on Beaverhill lake had to be abandoned.

ROCKY RAPIDS.

The new power site on the Saskatchewan river, just below Rocky rapids is situated in township 47, range 7, west 5th meridian, and lies about 35 miles south of Entwistle, a station on the Grand Trunk Pacific railway, 66 miles west of Edmonton. This site was reached on June 17, and four days were spent at the camp of the engineers of the Sir John Jackson Company, Limited, who rendered every assistance possible during the inspection of the site and the examination of the river for several miles above the site.

Owing to the limited time at our disposal, the high stage of the river, and the extent and wooded nature of the river valley, it was impossible at the time of the inspection to do more than roughly estimate the size of the reservoir that would be created by the proposed dam.

At the dam site the right bank is a cut bank rising about 225 feet above the river surface, composed of alternate layers of sandstone, shale and clay. The river lies at the foot of this high bank, and at high water is about 500 feet wide. On the left bank the flat runs back for about 700 feet and then rises in a horizontal distance of 300 feet to a height of approximately 200 feet. A head of 85 feet can be obtained by the erection of a dam of that height, no rapids or falls existing at this point. The length on the crest would be 1,500 feet, and the dam would be built on a sandstone foundation. A diamond drill was used to determine the foundation conditions, and holes were bored to a depth varying from 100 to 200 feet; these holes showed alternate layers of shale and sandstone.

A dam 85 feet high would create a reservoir of approximately 7·5 square miles area, which would be of great value in regulating the winter flow.

The engineers for the Sir John Jackson Company, Limited, state in their report on the power possibilities of this site, that the reservoir will supplement the low-water flow of the river, so that a total of not less than 35,000 effective horse-power may be expected to be developed by the turbines, a total depth of 40 feet of water being available for this purpose.

The proposed market for this power is the city of Edmonton, and the report further states that a total of 28,000 horse-power will be available for delivery in the city.

SHINING BANK CREEK.

This creek was examined to determine the possibility of the development of a small water-power for local purposes. Applications have been made for the power by the homesteaders residing on the banks of the creek.

Two sites were examined, the lower site, or site No. 1, being situated in NW. ¼-19-56-13 W. 5th M., and site No. 2 in SE. ¼-23-56-14 W. 5th M. These sites are reached by wagon road from Peers, a distance of 16 miles.

Shining Bank creek has its source in Shining Bank lake, township 56, range 14, west of the 5th meridian, and flows in a general easterly direction, emptying into the McLeod river in section 20, township 56, range 13, west of the 5th meridian. The stream is approximately 6 miles long, has an average width of about 20 feet, and is very sinuous in its course. Around the easterly end and outlet of Shining Bank lake lies a large spruce and tamarack muskeg through which the creek flows for the first mile of its course. The creek valley then becomes deeper and narrower, the banks rising on either side to a height of from 50 to 80 feet, the valley being about 1500 feet wide at the top throughout section 23. Through section 19 the valley becomes a little wider and the banks lower. The fall in the creek through the sections examined was found to average about 1 foot on 100 feet. No discharge measurements of the creek were available prior to the inspection, and the only records to hand are those obtained on June 27 and again on November 13, 1914.

On June 27 the discharge recorded was 100 c.f.s., and on November 13, 12 c.f.s.

Site No. 1.—It was ascertained from an inspection of the site and a reconnaissance survey that a head of 10 feet could be obtained. The applicant first proposed building a dam and installing a turbine water-wheel to develop power to operate a small saw-mill for local purposes, for which he requires about 25 horse-power. He now intends building an earth-fill dam with a core wall of sheet-piling; the dam to be built for a 10-foot head. This type of dam is most suitable for the site chosen, and with a little care during construction should result in a safe and watertight structure.

With the 10-foot head the applicant can probably secure a minimum of 20 horse-power for six months of the year.

Site No. 2.—The remarks above, applying to the general features of the creek, apply also to this site. At this site the applicant had, during the winter and spring of 1914, built a dam and water-wheel with the idea of developing power to operate a small saw-mill. The dam is built of timber and is of the rafter and strut framed type, designed for an ultimate 12-foot head, but, as so far completed, only gives 5-foot head. A box flume runs through the bottom of the dam to a wooden wheel which is placed on the outside struts. The wheel is an undershot, straight-bladed type, and is made of sawn lumber. It is 12 feet in diameter, with sixteen paddles, and runs on a wooden axle with wood bearings. At the time of the inspection the dam was undermined and the whole flow of the creek was passing under the dam. No sheet-piling had been used to prevent undermining, neither had there been a sufficient backing of earth placed on the up-stream edge of the dam.

The entire installation is somewhat elementary and cannot be considered stable, and it was recommended that, before the applicant be granted a license, he repair the dam and make it watertight by driving sheet-piling along its up-stream edge down into the hardpan, continuing the sheet-piling well into both banks. It was also recommended that he install a turbine water-wheel so as to efficiently use the power available.

With a 12-foot head, the applicant could probably secure a minimum of 25 horse-power for six months of the year.

GULL LAKE.

Gull lake is tributary to the Blindman river and thence to the Red Deer river, and is situated in townships 40, 41, 42, range 28, west 4th meridian, and range 1, west 5th meridian. This lake was examined in respect to its storage possibilities in connection with a proposed power site on the Red Deer river.

The lake is easily reached from Lacombe, the distance being about 9 miles, through settled country with good roads.

The total area of the lake is approximately 25,700 acres, and the area of the catchment basin is approximately 124 square miles.

Along the east side of the lake the shores are, for the most part, high and sloping. On the southeast end there is a sand beach nearly 2 miles in length, with banks varying from 5 to 10 feet in height above the lake level. This beach is a popular summer resort for the citizens of Edmonton, Calgary and Lacombe, there being, at present, about 120 summer cottages and one summer hotel built along the beach, while about fifty cottages have been built on the west shore. The banks on the west side of the lake, for about three-quarters of its length, average 20 feet in height, and for the rest of the way are low and flat.

The outlet of the lake is low, marshy, and weedy, and approximately half a mile in width. This marsh narrows until at about one-half a mile from the lake the creek channel is clearly defined. It is about 10 feet wide and 2 feet deep. As the creek approaches Blindman river the banks become high and steep and the current swift.

The only record available regarding the run-off from the lake is that secured at the time of inspection, July 9, 1914, when the flow was 33 c.f.s.

The conclusion reached regarding the lake is that there is not sufficient run-off from the drainage area to make the lake of any value as a storage basin.

JACKFISH LAKE.

Jackfish lake is tributary to the North Saskatchewan river, and is situated in townships 46, 47, 48, range 17, west 3rd meridian. The lake is easily reached via Canadian Northern railway to Meota, a summer resort on the west shore of the lake and distant about 22 miles from North Battleford.

The area of the lake is approximately 18,200 acres, and the approximate area of the catchment basin is 1,500 square miles.

Along the east side of the lake the banks are, for the most part, high and sloping. At the southwest end of the lake the banks rise from 7 feet to 10 feet above lake level in a distance of 300 feet. From Meota on the west shore, and extending south for about 3 miles, the banks are from 10 to 20 feet high. This stretch of shoreline is at present used as a summer resort, there being about fifty summer cottages built along the beach. To the north of Meota the banks are flat, being much similar to those at the southwest end of the lake.

The outlet at the south end is choked with rushes, the banks are low and flat, and the country for a few miles to the south of the lake is also low and flat, being only 6 or 7 feet above lake level.

The only record available regarding run-off from Jackfish lake is that obtained on July 15, 1914, when the discharge was 58 c.f.s.

With the conditions obtaining, it was doubtful if 2 feet of storage could be placed on the lake annually, and the idea of utilizing the lake as a storage basin was therefore abandoned.

RED DEER AND MONTREAL LAKES.

Montreal, Red Deer, Big Trout, and Little Trout lakes lie about 60 miles north of Prince Albert, Sask., and close to the third meridian. They drain northward through Montreal river into the Churchill river, which flows in an easterly direction to Hudson bay. The two former lakes are reached via wagon trail from Prince Albert, and the latter by canoe route from Red Deer lake.

These lakes were examined on behalf of the city of Prince Albert to ascertain the possibility of creating storage by means of a series of dams at their outlets, and of diverting the impounded water southward through the Little Red river (sometimes called the Spruce river), a distance of approximately 60 miles to the North Saskatchewan river, to augment the low-water flow in this river for the benefit of hydro-electric power development.

A reconnaisance inspection was made of the lakes and the surrounding country and across to the headwaters of the Little Red river. The water surface of Red Deer lake was given an assumed datum elevation of 200·00 Using this datum throughout, the elevation of Montreal lake was found to be 106·0, Big Trout lake 180·00 and Bear Trap lake 218·00. From Bear Trap lake a diversion ditch had been dug across a low divide to the Little Red river, by the Prince Albert Lumber Company. The elevation of the lower end of this ditch was 216·00.

From these levels it was seen at a glance that it was impossible to utilize Montreal and Big Trout lakes in connection with the storage scheme.

It was also noted that the water surface of Red Deer lake would have to be raised to elevation 218·00 before the lake could be utilized as a storage reservoir.

There are no records available of the run-off from these lakes, though on July 30, 1914, a metering of the Red Deer river, taken about 1 mile from the outlet of the lake, recorded a discharge of 125 c.f.s. This one measurement was of little use in computing the annual run-off from the lake.

It was assumed that the average annual precipitation on the drainage area of Red Deer lake was 16 inches, and that the run-off was 6 inches. Using these figures it would take five years to raise the water level of the lake 18 feet to 218·00, which elevation is necessary to reach the level of the headwaters of the Little Red river.

Another feature against the scheme was the fact that the valley of the Little Red river is low and flat, and the river channel small and very tortuous in its course, with low banks for the greater part of its length. These conditions would, in the event of stored water being brought down the river during the winter, result in excessive

losses due to overflowing and freezing, and it would not be economically feasible to improve the river channel to take care of the limited amount of water that might be made available.

Thus the idea of utilizing these lakes as storage basins for the benefit of the North Saskatchewan river has been abandoned.

SASKATCHEWAN RIVER.

Early in the season a trip was made by canoe from Prince Albert, Sask., to Pas, Man., in order to investigate the power possibilities on the Saskatchewan river between Prince Albert and the Sipanok channel. Plans obtained from the Department of Public Works were used to locate the various sites examined and also to locate the bench-marks established by that department along the river. These plans also established the mileage along the river channel, the mileage of the Canadian Northern railway bridge at Prince Albert being zero and the mileage of the entrance of the Sipanok channel into the Saskatchewan river being 173.

Possible power sites were examined at about ten points along the river, and six of these, namely, at miles 38¾, 51½, 70, 84, 101⅝, and 161½, were finally chosen as the only ones which might offer opportunities for successful development. A brief description of the sites chosen follows:—

(*a*) Mile 38¾—

	Feet.
Width of river (August 15, 1914)	900
Length of dam (40-foot head)	1,235
Water level (P.W.D. datum)	1,238·89
Headwater elevation	1,278·89

The site is situated about 1,800 feet below the "Forks," or the confluence of the North and South Saskatchewan rivers. The right bank rises fairly steeply, reaching a height of 75 feet in 185 feet from the water's edge. The left bank has a more moderate slope, reaching a height of 47 feet in 375 feet. A dam having a 40-foot head at this point would create a large pond, extending 5½ miles up the North Saskatchewan river and 13 miles up the South Saskatchewan river. Very little land would be flooded, as the banks are high, and the land which would be flooded is in its natural state and covered with balm of Gilead, poplar, and underbrush.

(*b*) Mile 51½—

	Feet.
Width of river (August 17, 1914)	780
Length of dam (40-foot head)	900
Water level	1,192·3
Headwater elevation	1,232·3

Here the right bank is a cut bank 90 feet high, and the left bank rises 60 feet in 90 feet from the water's edge. A dam with a 40-foot head would create a pond extending back up the river for 11 miles. Very little land would be flooded as the pond would be largely confined within the river banks.

(*c*) Mile 70—

	Feet.
Width of river (August 18, 1914)	860
Length of dam (55-foot head)	1,340
Water level	1,134·1
Headwater elevation	1,189·1

The right bank rises 100 feet in a distance of 275 feet from the water's edge, and the left bank 80 feet in 420 feet. A dam with a 55-foot head would create a pond extending up the river about 18 miles, with very little flooding. It would be possible to put in a dam for a 70-foot head here, in so far as the banks are concerned, but such a development would eliminate any possibility of development at mile 51½, and would

leave a considerable fall in the river unutilized. A head of 55 feet is therefore assumed, bringing the headwater elevation about 3 feet below the tailwater elevation of mile 51½.

(*d*) Mile 84—

	Feet.
Width of river (August 18, 1914)	1,115
Length of dam (40-foot head)	1,545
Water level	1,090·7
Headwater elevation	1,130·7

Here the right bank rises 84 feet in a distance from the water's edge of 290 feet, and the left bank rises 89 feet in 350 feet. The pond created by a dam of 40-foot head would extend back about 13 miles and flood very little land. The land that would be flooded is uncultivated and is covered with a growth of poplars and underbrush.

(*e*)—Mile 101⅝—

	Feet.
Width of river (August 20, 1914)	625
Length of dam (30-foot head)	1,280
Water level	1,034·8
Headwater elevation	1,064·8

Here the right bank is a steep cut rising 173 feet in a distance of 288 feet from the water's edge. The left bank is a long slope running up from a boulder-covered shore to a flat with poplar and underbrush, and rising 36 feet in 1,300 feet back. The pond created by a 30-foot dam would extend back about 7½ miles and flood very little land.

(*f*)—Mile 161½—

	Feet.
Width of river (August 24, 1914)	1,070
Length of dam (60-foot head)	1,390
Water level	917·5
Headwater elevation	977·5

This site is located about the middle of Squaw rapids, and the high banks are close to the river on both sides. The right bank rises 71 feet in 235 feet, and the left bank rises 85 feet in 195 feet. A dam with a 60-foot head would create a very large pond, extending back upstream 36½ miles and covering a considerable area of land. The land that would be submerged is covered with timber and underbrush, poplar and balm of Gilead predominating, but with considerable areas of good spruce.

FOUNDATION CONDITIONS.

During the trip of investigation no attempt was made to ascertain the foundation conditions below the surface by test pits or borings. No rock formations or outcrops were observed at any point in the stretch of river traversed, but at all the sites the foundation conditions, so far as indicated on the surface, were identical. Along nearly the whole stretch of the river, and at all the sites, the banks were composed of a fairly light sandy clay loam. The shores up to above high-water mark, together with the bed of the river, were covered with gravel and large boulders.

At Prince Albert, inquiries were made as to the nature of the foundations of the piers of the Canadian Northern railway's bridge over the Saskatchewan there. It was learned that these piers are resting on hard-pan which underlies the silt and gravel of the river bed. At Cole falls, the city of Prince Albert dam, so far as completed, rests on a hard clay foundation. The canal is excavated through a sandy clay loam of a silty nature which would be easily eroded but is practically impervious to water. The foundations at the power-house site and at the canal intake are probably of the same nature as that of the dam.

These two points, the Canadian Northern railway bridge at Prince Albert and the Cole falls site, 21 miles below, are the only locations at which information with respect to sub-surface conditions could be obtained; but it would seem reasonable, from the similar surface appearance and characteristics, to assume that similar foundation conditions can be expected at the sites investigated and mentioned above.

RUN-OFF CONDITIONS.

Discharge measurements have been taken continuously throughout the year on the North Saskatchewan river at Prince Albert, Sask., and on the South Saskatchewan river at Saskatoon, Sask., since 1911. Adding the flow of these two rivers, as given at these points, the minimum flow of the Saskatchewan river, below the confluence of the North and South branches is about 2,400 c.f.s., and the flow, dependable for eight months of the year, is 6,500 c.f.s.

Using these figures as a basis for the discharge of the river, the following table has been prepared showing the possible power development of the Saskatchewan river:

POSSIBLE POWER DEVELOPMENTS, SASKATCHEWAN RIVER.

Power Site. — (Miles below Prince Albert.)	Estimated Discharge in c.f.s.			Horse Power.		Remarks.
	Head in feet.	Dependable for 8 months.	Minimum.	For 8 months using discharge of Col. 3.	Minimum using discharge of Col. 4.	
1	2	3	4	5	6	7
Cole falls—						
Mile 29	28	2,500	1,000	6,363	2,550	Under construction
Mile 38¾	40	6,500	2,400	23,640	8,730	
Mile 51½	40	6,500	2,400	23,640	8,730	
Mile 70	55	6,500	2,400	32,500	12,000	
Mile 84	40	6,500	2,400	23,640	8,730	
Mile 101⅝	30	6,500	2,400	17,725	6,545	
Mile 161½	60	6,500	2,400	35,455	13,090	Squaw rapids.

NORTH SASKATCHEWAN RIVER—KOOTENAY PLAINS.

The North Saskatchewan river was examined at Kootenay Plains to ascertain the possibilities of creating storage at this point to augment the low water flow of the river for power purposes. The proposed reservoir site lies, approximately, in township 39, ranges 14 and 15, west of the 5th meridian, and can now be reached with pack-horse outfit in half a day from Nordegg, a small coal-mining town at the terminus of the Canadian Northern railway running west from Red Deer.

The proposed storage basin lies between the Big Horn range and the Brazeau range of the Rocky mountains. Here the river flows in an easterly direction with a fall averaging approximately 11 feet to the mile.

The bottom of the river valley is wide and flat. The river bed is composed of gravel, and the river channels shifting from year to year have built up extensive gravel and sandbars and considerably widened the main bed of the river.

The south bank of the river is high and steep throughout the entire length of the basin, and is covered with a growth of spruce and jack pine up to 6 inches in diameter, with some spruce up to 12 inches in diameter.

On the north bank of the river there are extensive flats which are covered with jack pine and spruce, while the direct banks are covered with poplar and grass. Towards the lower end of the storage basin the river narrows to a width of 200 or 300 feet, and the valley becomes narrower. In this section a high river bank on one side is opposed by a low flat bank on the other side.

The proposed dam site lies in a gap of the Brazeau range. At this point the river is 300 feet wide in high water, though at the time of the inspection it was only 195 feet wide. The right bank rises to a height of 200 feet in a distance of 500 feet from the water's edge. The left bank rises 66 feet in a distance of 900 feet from the water's edge beyond which it becomes very steep. It has been proposed to build a rock-fill dam 175 feet high at this point. Such a dam would be about 1,800 feet long on the crest, and would create a storage basin with capacity of 239,000 acre-feet. While there is plenty of material close to the dam site to build such a dam, it is doubtful if the scheme would be an economical proposition. Again, it is doubtful whether a power plant built on the river any great distance below the basin would receive much benefit from the storage during the winter season, since the losses through freezing would greatly reduce the efficiency of operations.

BRAZEAU RIVER.

In order that this branch could deal more intelligently with an application for water-power rights on the Brazeau river, a reconnaissance inspection was made in October of the possible power and storage sites on the river, as dealt with in the application. The inspection covered that portion of the river from Brazeau lake to within a few miles of the mouth of the north branch, a distance of approximately 45 miles.

The Brazeau river has its source in Brazeau lake situated on the eastern slope of the Rocky mountains and approximately in township 39, ranges 22 and 23, west of the 5th meridian It is a mountain stream fed by glaciers, as are also its tributaries down to and including the Southesk river. The discharge of the river varies greatly with the temperature, the floods occurring in the summer, due to the melting snow and ice in the mountains, and the low flow occurring in the winter months.

Brazeau lake was first examined with a view to ascertaining its storage possibilities. Conditions at the outlet of the lake are not favourable for a high dam, and it is doubtful if they are favourable for a dam construction of any height.

A low rock ridge or barrier extends across the easterly end of the lake at the outlet, and is approximately 900 feet long and from 15 feet to 30 feet above lake level. It is composed of huge limestone and quartzite boulders, and the whole barrier is fragmentary and pervious.

On October 5 no water was passing down the outlet channel from the lake, the whole flow of the river (110 c.f.s.) passing underneath this fragmentary barrier. The shores of the lake on both sides are, for the most part, of an even and gradual slope up to the base of the mountains which run along both sides and the west end of the lake.

The second storage basin examined is situated above the canyon some 5 or 6 miles above Job creek. At this point the river enters a box canyon about three-quarters of a mile in length and from 100 to 150 feet deep, and varying in width from 50 to 150 feet, the sides and bottom being composed of limestone. An 80-foot dam at the upper end of this canyon would be 90 feet long on the crest; a dam 125 feet high would be 300 feet long on the crest, and one 150 feet high would be 400 feet long on the crest.

A dam 120 feet high would provide approximately 10,950 acre-feet of storage, and a dam 150 feet high would provide approximately 22,790 acre-feet of storage.

Towards the lower end of the canyon, the river has, in a series of falls, a total drop of 45 feet in a distance of 200 feet.

With the exception of this canyon, the banks of the river from a point about 2 miles below Brazeau lake down to near the mouth of the Southesk river are low, sloping up to the base of the mountains which form both sides of the valley down to this point. About 300 feet below the Southesk river the Brazeau river cuts through a sandstone dyke, forming a short canyon about 300 feet long. The right bank is 80 feet high and the left bank 110 feet high. From this canyon down to Thistle creek the river banks consist of a series of benches rising from 100 to 300 feet above the water level, the river banks being alternately high and low at the numerous bends of the river. Rock outcrops of shale and limestone occur all along this section, and the stream falls over low rock ledges, forming a series of small cascades and cataracts. The fall in this section is about 24 feet per mile. From Thistle creek down to the junction of the south branch of the Brazeau river the fall of the river is not so rapid, but the banks become higher with a straight pitch into the river on an approximately 60-degree slope. The banks range in height from 300 feet above water level at Thistle creek, where the river valley is narrow, to about 600 feet above water level in a width of approximately 1 mile, along that section between the north and south branch of the river. At each bend in the river a high bank on one side is opposed by a small flat on the other; the banks are composed chiefly of clay and gravel.

In the application for power rights on this river it was proposed to build a low diversion dam, presumably just below the mouth of the Southesk river, and divert the water to the power-house site through a canal 12 miles long and pressure pipelines 6,000 feet long with a capacity of 600 c.f.s., and thereby obtain a head of 500 feet. Such a scheme may be possible but only after detailed and accurate surveys have been made can estimates be made of the cost of development. At present the scheme does not appear to be economically feasible nor is it one that appears attractive as a hydro-electric proposition.

RED DEER RIVER (CANYON SITE).

The investigation of the Canyon site on the Red Deer river was made with a view to ascertaining the possibility of developing hydro-electric power to supply the town of Red Deer, Alta. In the report of last year the results of the examination of two sites on the river near the town were given, and also of the possibility of creating storage on Sylvan and Cygnet lakes. A third site, located about 7 miles from the town, was investigated in November, 1914, and is here reported upon.

The dam site chosen was located in what is known as the "Canyon," which is a stretch of the river about 4 miles long with banks from 350 to 400 feet high in a valley width of about 2,000 feet. The site is situated at a point about a mile downstream from the upper end of the canyon, and the investigation covered the river bed and valley from a point about 1 mile below the site to a point about 13 miles above. A topographic survey was made of this section of the river, and plans were plotted from the notes.

Records of the discharge of the Red Deer river are available for the years 1912, 1913, and 1914, taken at a station in the town of Red Deer. From these records the minimum flow available for eight months of the year is 600 c.f.s., while in the winter months the flow falls as low as 100 c.f.s., with a minimum mean monthly flow for the three years of 238 c.f.s. It will thus be seen that if an hydro-electric plant of any great capacity were installed, it would be necessary to install an auxiliary steam plant to take up the power load during the winter months.

In discussing the economic feasibility of a power plant at the Canyon site, three working heads were considered, namely, 90, 60, and 40 feet. The plant in each case was assumed to be of such a size as to use the minimum flow for eight months, or 600 c.f.s., and a steam auxiliary in Red Deer was assumed to make up the deficiency in winter. The cost of the combined plants was estimated in each case, and also

the annual charges, from which the cost per kilowatt hour of electric energy sold was computed. The cost of a steam plant of the same capacity as the hydro-electric plant was estimated for each case and the cost per kilowatt hour computed. In all cases, a 50 per cent load factor was assumed.

From the computations it was found that in each case considered the cost per kilowatt hour of electric energy was less for a steam plant in Red Deer than for a combined hydro-electric plant and steam auxiliary. It was therefore decided that it was not at all feasible to construct a plant at the Canyon site on the Red Deer river.

Apart from the actual cost of developing power, the market for the output must be considered. At present there is a steam plant of 325 kw. capacity in Red Deer, and this plant takes care of the lighting and any other electrical requirements of the town. It is very doubtful if the market will increase to any great extent in the next few years, and on that account, as well as that of its higher cost over power from a steam plant, it would not be expedient to install a hydro-electric plant at the Canyon site.

FLAT CREEK.

Following an application for the right to develop a small water-power on Flat creek for local purposes, an examination of the proposed power site was made in November.

The site is situated in NE. ¼-2-65-20, W. 4 M., and is reached by wagon road from Athabaska.

Flat creek is a tributary to Flat lake, joining the latter in township 63, range 20, west of the 4th meridian. The creek is approximately 12 miles long and has its source in township 65, range 19, west of the 4th meridian.

The only available record of the discharge of the creek is the one obtained on November 9, 1914. On that date the discharge was 20 c.f.s.

In section 2, township 65, the creek flows through a valley averaging about 300 feet wide and varying from 30 to 50 feet in depth. The fall in the creek was found to be 7·8 feet in a distance of 1,700 feet.

The banks of the creek averaged about 6 feet in height above the water level of the creek on November 9, 1914. High-water mark was observed to be 3 feet higher than this level.

At the site chosen it is quite possible to secure by means of a dam a head of 20 feet. Such a dam would be 300 feet long on the crest.

The applicant wished to secure power for saw-mill, flour- and grist-mill purposes, and stated that he would require about 25 horse-power throughout the fall and winter. He was advised that the creek would not supply the amount of power required during that period.

PRAIRIE CREEK.

The investigation of Prairie creek was made with a view to ascertaining the possibility of developing a small water-power for which there was application on file. The site is situated in SW. ¼-5-38-8, W. 5th meridian, and is reached by driving a distance of about 20 miles by the wagon road from Rocky Mountain House.

Prairie creek has its source in the foot-hills of the eastern slope of the Rocky mountains in township 38, range 10, west of the 5th meridian, and flows southeasterly and then northerly, and empties into the Clearwater river in township 39, range 7, west of the 5th meridian.

The drainage area of the stream above the power site is a hilly, rolling country covered with a growth of small poplar, willow brush, spruce, and jack pine, and comprises an area of approximately 50,000 acres.

The stream throughout SW. ¼-5-38-8, west 5th meridian, has an average width of 50 feet; the banks are very steep and are composed of clay loam and vary from

7 to 10 feet in height above the water level of November 20, 1914. A reconnaissance survey was made of the creek throughout this section, and the fall in the creek was found to be 9 feet in a distance of 5,500 feet.

Some years ago the applicant built a water wheel and saw-mill on his homestead. This installation consists of a timber crib built on the right bank and the saw-mill on the left bank of the creek. The crib is 29 feet long, 6 feet wide, and 11 feet high, and is filled with sandstone. Piles 10 inches in diameter have been driven on the left bank and stone and gravel thrown around them. On these piles is built an unroofed log building 14 feet square and 10 feet high, the floor of the building being nearly level with the top of the bank.

The crib on the right bank and the saw-mill on the left bank are 25 feet apart, and connecting them is an undershot wooden water-wheel 21 feet long and 7 feet in diameter, with thirteen paddles. Both ends of the water-wheel are resting on a balance arm so that the wheel can be raised or lowered to suit the stage of the water in the creek. It can also be raised or lowered through a vertical distance of approximately 8 feet by means of an overhead winch operated from the left side. Each end of the axle of the wheel is encased in an iron cup, the bearings being of sheet steel. The driving pulley is 9 feet in diameter, and is connected to the water-wheel by a tumbling rod 16 feet long and 10 inches in diameter. The tumbling rod is attached to the wheel and driving pulley by universal joints, thus permitting the wheel to be operated at any head through the lower 4-foot limit.

The saw-mill outfit consists of a straight up-and-down cutsaw, cutting only one way, and used for cutting lumber, together with a 26-inch circular saw for cutting logs and firewood. The whole outfit, with the exception of the saws, was built by the applicant, and is rather crude, only cutting from 200 to 600 feet per day.

As this outfit could only be operated during the summer months, the applicant desired to know if he could, by building a new dam and installing a turbine water-wheel, develop 10 horse-power or more continuously throughout the year.

The investigation showed that a head of only 5 feet could be obtained, and that it was quite possible that the flow would drop as low as 5 c.f.s. during the severe winter months. During the flood season the water of the creek flows nearly level with the top of the banks. These conditions obtaining, the applicant was advised that it would be impossible to obtain 10 horse-power continuously throughout the year, though he could possibly develop 25 horse-power for seven months of the year.

MEDICINE RIVER.

Two sites were examined on this river in connection with the development of small water-powers, for which applications have been made to this branch. The upper site or site No. 1 is situated in NW. ¼, 4-40-3, W. 5 M., and the lower site or site No. 2 in NW. ¼, 15-39-3, W. 5 M.

The Medicine river is a tributary of the Red Deer river, flowing into it from the north in section 5, township 36, range 1, west of the 5th meridian. It takes its rise in township 44, range 6, west of the 5th meridian and flows in a southerly direction, being very sinuous in its course. The stream averages about 40 feet in width and flows over a bed composed of gravel and silt, which in some places overlies a bed of sandstone. The banks are for the most part clay and clay loam, varying in height from 5 feet to about 40 feet, a high bank on one side being generally opposed by a low bank on the other. The banks become lower as the mouth of the river is reached. The stream flows through a very fertile valley which is rapidly being settled and the land cultivated. The drainage area of the Medicine river, above site No. 1, is approximately 358 square miles, and above site No. 2, 385 square miles, and is chiefly a rolling hilly country partially timbered with poplar, willow and spruce. The only

available record of stream flow is the metering obtained at site No. 1 on November 25 last, when the discharge recorded was 30 c.f.s.

Site No. 1.—In 1913 the applicant built a power-house and grist-mill, and excavated an intake canal along the left bank of the river. Last summer he constructed a temporary dam which created a head of 3 feet.

The power-house and grist-mill is a log building 30 feet long, 18 feet wide, and 10 feet high from the floor to the eaves. Below the rear end of the building is the wheel-pit, in which the applicant has installed a turbine 5 feet in diameter, and of his own manufacture. The opening of the entrance chamber to the wheel-pit is 6 feet wide and 4½ feet high, and is controlled by two wooden headgates, each 3 feet wide, which fit into the lower sill and are operated from the room above. The inside dimensions of the entrance chamber are 6 feet by 6 feet by 8 feet long. The wheel-pit is 10 feet square, and is designed for a 5-foot head. The turbine is constructed of wood, with vanes of sheet metal. The guide ring is 5 inches wide, and seventy-two guide vanes direct the water on to the runner, which is 5 feet in diameter with a 5-inch ring containing thirty-six vanes. The turbine is fitted with a cylindrical gate of sheet metal controlled by a lever in the power-house. The shaft is vertical and transmits through a steel bevel gear to two main driving pulleys, each 4 feet in diameter, which are in turn belted with 8-inch belts, one to a small flour-mill and the other to a feed grinder.

The applicant desires to construct a permanent dam to create a 5-foot head, and was advised of the type of dam most suitable to his needs and of the details of construction. With a 5-foot head the applicant can develop a minimum of 8 horse-power up to the end of November, and this power will be sufficient for his purposes.

Site No. 2.—In October, 1914, the applicant for this site built a dam, turbine, and grist-mill, and installed a small feed grinder. The dam was not completed before freeze-up, but it provides a 4-foot head and enabled the applicant to operate the grist-mill last fall. When finally completed the dam will provide a 5-foot head.

The turbine is similar to the one described at site No. 1.

These two small power developments have proved to be a great convenience to the settlers in the community by enabling them to get their grain ground within the settlement.

SOUTHFORK RIVER.

The Southfork river was examined from its junction with the Oldman river up through townships 7 and 6, range 1, and township 6, range 2, west of the 5th meridian, to ascertain whether or not the river offered any suitable hydro-electric opportunities that might be developed to operate a combined saw-mill and pulp-mill. In connection with this same scheme, Mill creek was also examined up as far as Mountain Mill in township 6, range 1, west of the 5th meridian.

Three possible power sites were chosen on the Southfork river and one on Mill creek. These sites will be referred to as sites Nos. 1, 2, and 3, commencing with the lower site on the Southfork river, and the Mill creek site.

These streams are reached from Cowley, on the Crowsnest branch of the Canadian Pacific railway, about 40 miles west of McLeod.

The Southfork river has its source in the eastern slope of the Rocky mountains in townships 3 to 6, ranges 3 and 4, west of the 5th meridian, and flows northeasterly to its junction with the Oldman river in township 7, range 30, west of the 4th meridian. The flow of the river is typical of all mountain streams, subject to sudden variation and greatly influenced by conditions of temperature. During the winter months the flow is greatly reduced, while in the summer months floods occur, with great variation between high and low water. The main tributaries of the Southfork have their rise in the mountains and foot-hills, and all enter the river above section 20, township 6, range 1, west of the 5th meridian.

The drainage area of the upper reaches of the Southfork is in mountain territory and lies in the Crowsnest forest reserve. The lower reaches of the river is a rolling prairie country.

MILL CREEK.

In section 25, township 5, range 2, west of the 5th meridian, Gladson and Whitney creeks join, and from here to its junction with the Southfork river in section 7, township 6, range 1, west of the 5th meridian, the stream is known as Mill creek.

Mill creek lies wholly within the foot-hills on the eastern slope of Rocky mountains, and the whole of its run-off is mountain drainage. The valley is deep and narrow and the creek has a swift current, flowing over a bed of large gravel and boulders.

This stream also has a great variation in discharge, during the summer months a discharge of 1,700 c.f.s. has been recorded, while during the winter the flow has dropped below 10 c.f.s. Discharge records of these streams are available since 1910, and can be obtained from the reports on progress of stream measurement published annually by the Irrigation Branch.

Site No. 1.—At this site, which is situated in the southwest ¼ section 35, township 6, range 1, west of the 5th meridian, it is possible to obtain a head of 45 feet by the erection of a dam of that height; this dam would be approximately 400 feet long on the crest. In this section both banks of the river are high for a distance of about 1,500 feet.

The right bank is formed by a 60-foot sandstone cliff, practically perpendicular and with a dip downstream. The left bank rises about 20 feet in a horizontal distance of 100 feet from the water's edge, and then rises abruptly to a height of 125 feet above water level. It is composed of a sandy loam through which several rock outcrops of sandstone were observed.

Towards the upper end of the section a sandstone ledge runs right across the river; with this exception the river bed, as observed, was composed of coarse gravel and sandstone boulders.

With a head of 45 feet it is possible to develop a minimum of 818 horse-power for eight months. Power at 80 per cent efficiency.

Site No. 2—(Canyon Site).—At the west boundary of township 6, range 1, west of the 5th meridian the river valley narrows forming a canyon 150 or 200 feet deep and from one-half to three-quarters of a mile in length. The sides and bottom of the canyon are hard close-grained sandstone; the sides for the most part are covered with a deposit of clay loam through which numerous rock outcrops appear. In this canyon it is possible to build a dam of any height up to 125 or 150 feet. At the lower end of the canyon the river is 70 feet wide, while 200 feet upstream the river is only 40 feet wide. At the 40-foot section a dam 30 feet high would be about 100 feet long on the crest, and a dam 70 feet high would be from 200 to 300 feet long on the crest. No falls occur in the canyon, and any head created will be solely due to dam construction.

Just outside the lower end of the canyon, and from 300 to 500 feet below the proposed dam line, is a large flat which would make an excellent site for a power-house.

With a dam 50 feet high a minimum of 682 horse-power could be developed for eight months, and with a dam 70 feet high a minimum of 955 horse-power could be developed over the same period. Power at 80 per cent efficiency.

Upper Site.—The location of this site is about the west boundary of NW. ¼-24-6-2, west 5th meridian, a short distance below the mouth of Screwdriver creek. At this site the right bank rises on a one-to-one slope to a height of about 80 feet, while the left bank rises to a height of 50 feet in a horizontal distance of 60 feet from the water's edge. Large sandstone boulders were observed along both banks, and it is probable that a sandstone foundation could be secured for a dam at this point.

A head of 40 feet could be created by the erection of a dam, there being no natural fall. A dam 40 feet high would be about 250 feet long on the crest. Above the site the

high banks widen out and form a large flat which, in event of a dam being built, would be flooded and form an extensive pond. With a head of 40 feet a minimum of 545 horse-power could be developed for eight months. Power at 80 per cent efficiency.

MILL CREEK.

The location of the proposed site on Mill creek is at Mountain Mill in NW. ¼-7-6-1, west 5th meridian. At this point a head of 30 feet could be obtained by means of a dam about 200 feet long on the crest.

The right bank is nearly perpendicular, 45 feet high and composed of shale. The left bank is about 10 feet high and very steep. From the top of this bank the ground slopes gradually to the main slope of the creek valley, the whole being composed of shale, earth, and gravel.

The creek is about 70 feet wide during high water, the current is swift and flows over a bed of coarse gravel. With a head of 30 feet a minimum of 82 horse-power could be developed for eight months at this site. Power at 80 per cent efficiency.

BOW RIVER.

In order to deal more intelligently with an application for power rights on the Bow river in the precincts of the city of Calgary, a reconnaissance investigation was made of the reach of the river covered by the application. This investigation of the Bow river extended from Centre street, of the city of Calgary, easterly to the 5th meridian.

The Bow river has its source in the eastern slope of the Rocky mountains. The flow of the river is most susceptible to fluctuation due to changes in temperature, and varies greatly throughout the year. The flood period is from May until the end of July, during which period the run-off is augmented by the early seasonal rains and by melted snow and ice from the mountains. The Elbow river joins the Bow river within the city limits of Calgary; it likewise has its source in the mountains, and the conditions of flow are similar to those of the Bow river. The drainage area of the Bow river above the city of Calgary is approximately 3,500 square miles, while that of the Elbow is approximately 490 square miles, giving a total drainage area, serving the stretch of river immediately below Calgary, of nearly 4,000 square miles.

In the portion of the river dealt with in the application, the banks of the main valley are high and are generally from half to one mile apart. The river flowing through the valley thus formed is confined for the most part between low banks, although at certain points the main bank of the valley forms the direct banks of the river. These conditions do not provide attractive sites for development and in fact there are practically no points on the river in this vicinity offering natural advantages for development.

The river throughout the stretch examined has an average fall of 10·3 feet per mile, or a total drop of 113·7 feet in 11 miles.

In this stretch of the river the applicants propose to develop power at four different points by building a dam and power-house at each. These sites are designated on the general survey plan submitted by the applicants as follows: Dam B, 19-foot head; dam D, 18-foot head; dam E, 10-foot head; dam G, 12-foot head.

The plan submitted shows only the location of the dams in a general way, and is very indefinite. At none of the sites chosen are there any natural advantages for power development, nor is any mention made of the numerous interests along the river that would be affected by the construction of these dams. The protection of the existing interests would very materially increase the cost of the development of such a power scheme.

The development of hydro-electric power along this reach of the river does not appear to be economically feasible, but until a complete study of the scheme has been made, and conclusions drawn, nothing further can be said.

KNEEHILL CREEK.

Following an application for the right to develop a small water-power on Kneehill creek, the site was examined about the end of December. The site is situated in NW. ¼ 29, 29, 24, west 4th meridian.

Knechill creek has its rise in township 35, range 27, west of the 4th meridian, and flows in a southeasterly direction, emptying into the Red Deer river in township 29, range 21, west of the 4th meridian. The drainage basin above the site consists of a rolling prairie country and comprises an area of approximately 539 square miles.

In the vicinity of the site the banks vary from 6 to 40 feet in height, generally a low bank on one side, with a high bank on the opposite side of the creek.

At the power site the stream is 40 feet wide, the right bank is very steep and about 40 feet high, while the left bank rises only 15 feet in a horizontal distance of 107 feet from the water's edge.

The only discharge measurement available is the one obtained at the time of the inspection, when the flow was estimated to be 10 c.f.s.

A reconnaissance survey revealed the fact that a head of only 12 feet could be created by a dam which would be 150 feet long on the crest.

Assuming that the proposed plant would have an efficiency of 50 per cent this, with a head of 12 feet and a flow of 10 c.f.s. would only develop 6·8 horse-power, which is less than half the power that the applicant proposes to develop. This also appears to be the maximum power that can be developed during the five months, November to March, for it is doubtful if the discharge during February and March would exceed 5 c.f.s.

Under these conditions the applicant would be better advised to purchase a 25-horsepower gasoline engine, which would give him power at all times.

I have the honour to be, sir,

Your obedient servant.

C. H. ATTWOOD,

Chief Engineer, Alberta and Saskatchewan Power and Storage Studies.

No. 8.

REPORT OF K. H. SMITH.

March 31, 1915.

SIR,—I have the honour to submit the following as a summary report of my work for the year ending March 31, 1915.

Throughout the entire year, the undersigned has been engaged in the preparation of two water-power exhibits, one for installation in the Canadian building at the Panama-Pacific International Exposition, San Francisco, U.S.A., and the other for installation in the Industrial Bureau building at Winnipeg, Man.

The services of Mr. Gibson Catlett and his staff of artists were used extensively, and as their headquarters were in Toronto, the preparation of the exhibit was carried out in that place. Mr. George Challies has acted as assistant to the undersigned since June, 1914, while the services of Mr. Lawrence Mahaffy were available for this work from May, 1914, to August, 1914, inclusive, as also the services of Mr. Bruce Hogarth for the month of May, 1914.

CANADIAN WATER POWER EXHIBIT, PANAMA-PACIFIC EXPOSITION, SAN FRANCISCO, U.S.A.

The purpose of this exhibit is to show that practically every industrial centre throughout Canada, from coast to coast, has an abundant supply of power. It con-

sists essentially of a large topographic painting of Canada, 8 feet wide and 70 feet long, arranged in a semi-circle, and eleven working models of water-power plants in Canada supplying the larger industrial centres from coast to coast. There are also about sixty enlarged photographs depicting various water-power sites throughout Canada, developed and undeveloped.

This exhibit is now completely installed and on display in the Canadian building at San Francisco, where it is receiving the most favourable comments. It fits in most admirably with the general scheme of the Canadian exhibit as a whole, so successfully arranged by the commissioner general. Literature suitable for distribution in connection with this water-power exhibit has also been prepared.

WINNIPEG WATER POWER EXHIBIT.

This exhibit is intended to show the power possibilities of the Winnipeg river at various sites in Manitoba, and the relation of these sites to the city of Winnipeg.

It consists of a large topographic painting, 9 feet wide and 40 feet long, also eight working models. The large painting is arranged to show the power section of the Winnipeg river, indicating the locations of the various sites and their relation to the city of Winnipeg. The eight models show in detail, on a scale of 100 feet to 1 inch, these power sites developed and undeveloped. There are also several diagrams and a relief map showing the drainage basin of the Winnipeg river, and the whole is arranged very satisfactorily in the Industrial Bureau at Winnipeg, occupying four booths.

The whole exhibit shows in a most pleasing and forcible manner the very advantageous position which Winnipeg and the surrounding country enjoys, due to the large and excellent power possibilities of the Winnipeg river.

I have the honour to be, sir,
Your obedient servant,

K. H. SMITH.

No. 9.

REPORT OF T. H. DUNN.

OTTAWA, March 31, 1915.

SIR,—I have the honour to submit the following report on my reclamation investigations during the past year.

During the year just ended I inspected the following districts requiring drainage:—

1. The Carrot river in Manitoba and Saskatchewan.
2. Lake Winnipegosis in Manitoba.
3. Lake Manitoba in Manitoba.
4. Sumas Dyking and Drainage district in British Columbia.
5. Upper Columbia valley in British Columbia.
6. Silver creek in British Columbia.

Only in the first mentioned, the Carrot River project, was active field operations carried on.

I was assisted during the greater part of the season by G. G. McEwen, B.A.Sc., an engineer of long experience in drainage matters. The party in the field was made up as

follows:—G. G. McEwen, engineer in charge; O. W. N. Charlton, assistant engineer; F. A. N. Sproule, junior engineer; Geo. Woods, junior engineer.

A reconnaissance was made of the Carrot river scheme, together with an instrumental examination of a portion of the district immediately south of the town of Pas and lying between the Carrot river on the west and the Saskatchewan river on the east. I am preparing separate reports on this and on each of the other schemes visited by me, giving all the information obtained in my investigations.

An attempt was made to enter the McLaren tract, which lies west of the northern part of the Winnipeg river in the province of Manitoba, but with little success as the district is a vast swamp and not accessible during the summer months.

While in British Columbia I had an opportunity of paying a short visit to the completed Rannie project in the Pitt Meadows. So far as could be observed the dykes were in good condition and the area entirely free from water to a depth amply sufficient for all the ordinary purposes of agriculture. The pumps were idle at the time of my visit, and I learned that it was not necessary to operate them continuously even at that season, which was August. As there was as yet no road into the district, cultivation of the land had not yet been commenced, although I understood some use was being made of the natural grasses for stock.

The following is a brief description of the various projects at present under consideration.

THE CARROT RIVER PROJECT.

The name "Carrot river" has been given to this project because it is traversed somewhat centrally by this stream, which flows into the Saskatchewan river at a point about 2 miles west of the town of Pas. The district is also traversed by the Pasquia river, otherwise known as the "Pas" river, a much smaller stream than the Carrot, which joins the Saskatchewan river at the town of Pas. The combined drainage area of these two rivers is approximately 7,100 square miles.

The Carrot River district is a very important section of the area lately known as the Pasquia Reclamation district and might be called the Western Pasquia district, although this latter designation might lead to the supposition that it includes the large flooded area on the north side of the Saskatchewan and west of the town of Pas, which is not the case. The area lies west of the Pasquia ridge, on which the town of Pas is situated, and which extends southward from Pas towards the Overflowing river, and south of the Saskatchewan river. The south and west boundaries of the flooded area are somewhat indefinite, but may be roughly defined as the north boundary of township 51 and the east boundary of range 9, west of 2nd meridian, respectively. The town of Pas is situated at the northeast corner of the district at the junction of the Pasquia with the Saskatchewan river.

The lands comprised within the district are, so far as observed, all good clay lands of alluvial origin except the muskeg lands bordering on the Pasquia river east of the Canadian Northern railway. The clay is somewhat heavy, but cultivation and exposure to the weather renders it friable. The soil is of great depth, as indicated by a well sunk by a squatter at station 112 on the Pasquia river, which showed no perceptible difference in the soil at a depth of 40 feet and, of course, yielded no water. It is not known to what depth it will be necessary to go in order to reach water and, since the Pasquia and Carrot rivers freeze to [illegible] during the low winter stage, the problem of a water supply for both individuals and stock becomes a serious one.

For purposes of discussion I have called that portion of the area bounded by the Carrot river, Saskatchewan river, and Sipanok channel the "Carrot River Triangle" and the area east of Carrot river and Pasquia hills and west of the Pasquia ridge the "Pasquia River Triangle."

The greater part of the land within these two subdivisions, as well as a considerable area south of the Sipanok channel is flooded by the annual overflow of the Saskatchewan river in June, July, and August, when the snow melts in the Rocky mountains. Each year at this time the Saskatchewan river is taxed far beyond its capacity and overflows into the adjoining country through every opening in its banks. In this way the Carrot and Pasquia act as canals which flood the interior. Pasquia lake and Saskeram lake, which become almost dry in winter, are filled in this way in a very short time.

In seasons of moderate flood the banks of the Saskatchewan west of Pas are above high water, but there are openings in the bank which allow the water to pass into the interior where the ground is much lower than the banks of the river. In very high water, however, the banks are covered for miles to a depth of probably 2 or 3 feet. The banks west of Pas are of clay and, although they are what may be called cut banks and subject to a certain amount of caving during high floods, they are nevertheless very substantial. On the south side near Pas the bank is practically free from brush and trees but, proceeding west, small willows are encountered, then larger brush and trees with only occasional open places. The crown of the bank is broad and slopes gradually down to the interior level in marked contrast to the banks farther east where, particularly in the vicinity of Cedar lake and for a long distance west, the crown is very narrow, sandy and unsubstantial.

On rare occasions the water of the Saskatchewan rises very high, and on one occasion at least covered practically the whole of the country above and below the Pasquia ridge. It has been claimed by some that at that time the water flowed up the Pasquia river and crossed into lake Winnipegosis by way of the Overflowing river. Since the bottom of the Pasquia river at the Canadian Northern railway crossing at Turnberry is almost 70 feet above the normal water surface at the mouth of the Pasquia, it is apparent that such an occurrence is impossible. A story which has an element of possibility in it says that eighty or ninety years ago the water was so high that the Indians passed with their canoes by water from the Pasquia river to the Little river by way of Gordon lake and Grace lake.

The Pasquia river has several times changed its course, at one time emptying almost at the same place as the Carrot. It is also practically certain that it formerly flowed between the present site of the town of Pas and the Saskatchewan river, through the slough south of Mission island, and emptied into the Saskatchewan a short distance below the railway bridge.

In the report of his 1884 exploration, Dr. Klotz says that in 1844 the Saskatchewan river was so narrow opposite Pas mission that a lad could throw a stone across it. This would mean a river between 300 and 400 feet wide, or less than half the present width at its narrowest point. This would explain in some measure the greater height of the floods west of Pas in early times. One can imagine the time not very far back of that date when the river was so narrow that there was a continuous body of water from Pas westward, forming a large lake.

The following is an approximate estimate of the area supposed to be flooded or damaged by water:—

	Acres.
Carrot river triangle, about	727,000
Pasquia river triangle, about	586,000
Probable additional area south of Sipanok channel	125,000
Approximate total flooded area	1,438,000

This includes the muskeg in the southeastern portion of the Pasquia triangle, which is wet but not flooded by the Saskatchewan.

This total area drains to the Saskatchewan river, either through the Pasquia entering at the town of Pas or the Carrot river entering about 2 miles farther west.

A very large portion of this area which is subject to flooding is open grass lands, ponds, and sloughs, but there are patches of willows and also considerable areas covered with brush and trees. This latter condition is particularly noticeable along the Carrot and Saskatchewan rivers and, in some places, along the Pasquia river. The banks of the Carrot are for the most part above the moderate floods, but the adjoining areas are generally flooded each year.

The examination of the Carrot river district was undertaken as a result of the application of Mr. A. T. Shillington, M.D., and Mr. D. W. Bradshaw, with the object of determining the feasibility of reclaiming the flooded area either by dyking or drainage, or both, so as to render the lands suitable for agriculture. The time allowed for making the survey was very short and the funds available very slender, so that it was possible to examine only a small portion of the area. The work was confined almost entirely to the district east of the Carrot, through which three lines of levels were run easterly to the Saskatchewan river, crossing the Pasquia ridge to determine the point of lowest elevation. The first line, called Line "A," was run between townships 55 and 56 as far as Grace lake; the second, called line "B," was run just north of line "A"; while the third, called "C," was run between townships 54 and 55. The first two connect the Carrot and Pasquia rivers with the Saskatchewan river by way of Gordon and Grace lakes and Little river, while the third connects the Pasquia river with the Saskatchewan by way of Big lake.

Line "B" is the only feasible route for a canal, as all other points on the Pasquia ridge are much too high. This line would also have the added advantage over line "C" of draining a very considerable area of good land under and surrounding Grace lake. The land around Grace lake belongs, however, strictly to the Eastern Pasquia district, and is not included in the application of Messrs. Bradshaw and Shillington.

The most serious objection to this canal is that it depends for its outlet on the lowering of the Saskatchewan river by the completion of the Pasquia project. Other objections are that it must cross the Hudson Bay railway yards, and that it will interfere with the navigation of the Carrot river. The objection to crossing the railway yard would be largely eliminated and the interference with navigation on the Carrot entirely so, if the diversion of the Pasquia river alone be considered.

There are two methods which may be employed for reclaiming this area, but the economical features of each have not been fully developed. They may be briefly stated as follows:—

Scheme No. 1.—Dyking the south bank of the Saskatchewan river from Pas westward for a distance of about 25 miles, with dams at Sipanok channel, Carrot, Pasquia and Little rivers, and constructing a canal via Grace lake and Little river for the purpose of diverting the waters of the Carrot and Pasquia rivers.

Scheme No. 2.—Dyking the south bank of the Saskatchewan and both banks of the Carrot with dams across the Sipanok channel, Pasquia and Little rivers and constructing a canal via Grace lake and Little river to divert the waters of the Pasquia river.

The installation of a suitable pumping plant or plants in the Carrot river triangle.

The first of these plans depends on the completion of the Pasquia reclamation project, which has for its object the lowering of Cedar lake and the consequent lowering of the flood elevation of the Saskatchewan river below Pas.

The second plan also depends on the lowering of the Saskatchewan river east of Pas for the drainage of the Pasquia river triangle, but the drainage of the Carrot river triangle is entirely independent of the Pasquia reclamation project.

The drainage of the latter depends entirely on dyking, drainage, and pumping within the "triangle" itself.

Sufficient information has not been obtained on which to base an estimate of the cost of dyking and pumping, and too much dependence must not be placed on such estimates as given below. The estimate of quantities to be excavated are fairly accurate except on that portion of the line from the junction with the Little river east. The classification of the materials is very uncertain, but it is practically certain that no rock will be encountered. The Pasquia ridge is chiefly gravel and boulders in a soft clay matrix, which becomes very soft in water West of the ridge the material is chiefly clay, while east of the ridge there is both clay and muck with two narrow ridges of stony material in the bottom of the Little river similar to that in the Pasquia ridge.

The following gross estimate may be considered as a rough approximation:—

Scheme No. 1		$ 2,117,000 00
Scheme No. 2—		
(*a*.) Pasquia river triangle	$ 821,000 00	
(*b*.) Carrot river triangle	882,000 00	
		$ 1,703,000 00

The estimate of cost for the Carrot River triangle includes $346,500 for the installation of pumping plants at suitable points throughout the district, but does not include the cost of pumping, maintenance, and depreciation, which I have estimated at $72,700 per annum for the whole area of 727,000 acres, or 10 cents per acre per annum. It is probable that the western portion may be economically drained by gravity in open ditches.

Rainfall records at Pas are not very complete, but, so far as they are available, they indicate an average monthly precipitation of about 2 inches for the five months, May to September, inclusive, for the past five years. It was on this basis that the cost of pumping was estimated, while the capacity of the plant was based on a maximum rainfall of 6 inches per month, with a 5 per cent run-off.

It may seem unusual to suggest the dyking and pumping of low-priced lands such as these, but the conditions here are exceptional and there are some very good reasons why it may be cheaper to pump the water than to drain it away by gravity in an open canal. Some of the conditions favourable to pumping are as follows:—

(1) The rainfall is light, averaging only about 2 inches per month during the pumping season.

(2) The dyke material will be practically impervious to seepage.

(3) There are no streams entering the district from the outside.

(4) It is improbable that there are any springs in the district.

(5) Dyking and pumping leaves the Carrot river open to navigation and avoids the construction of a large canal across the Hudson Bay railway yards.

A comparison of the cost of scheme No. 1 and scheme No. 2 shows an apparent advantage in favour of the latter of $400,000. Against this, however, must be placed the cost of pumping, while against both schemes must be placed their respective shares in the cost of the Pasquia Reclamation project. When these factors have been considered and given their proper value it will be found that there is little to choose between the two schemes so far as the matter of cost is concerned. When everything is considered the all-gravity scheme will probably have a small balance in its favour as far as cost is concerned, but the combination gravity and pumping scheme has many advantages, some of which have already been cited.

By adopting this latter scheme the reclamation of the Carrot River triangle, containing approximately 727,000 acres, could be proceeded with at once regardless of whether the Pasquia project was ever proceeded with or not. This would not inter-

fere with the reclamation of the remaining half of the district at any time when the construction of the Pasquia work would permit it.

Approximately $600,000 would be required for the construction of the necessary dykes and drains for the Carrot River triangle. The pump units need not be installed until required by the settlement of the district. The Carrot River triangle is virtually an island, as the Sipanok channel, which bounds it on the south, heads in the Saskatchewan river and returns to it again by way of the Carrot river. It therefore cuts off all water from the exterior, except very high water, which must be kept out by dykes, and leaves no water to pump except rainfall. The dyking and drainage of this section could probably be completed in two or three years.

The Carrot and Pasquia rivers are both navigable during the greater part of the season for small boats drawing 3 or 4 feet of water, but the Pasquia is very narrow, and the Carrot is intersected longitudinally by the log boom of the Finger Lumber Company, which leaves a narrow passage along the westerly side of the river, and even in this passage there are many partly sunken logs which are a menace to navigation. Should the reclamation of this area be completed the navigation of the Carrot river would become of considerable importance.

The Hudson Bay branch of the Canadian Northern railway traverses the area along its eastern border and terminates at Pas, where it connects with the government line to Hudson bay now under construction.

The Saskatchewan river is navigable for the most part for vessels of light draught, but there are many bars which form obstructions in low water, and the Department of Public Works are considering the improvement of the river from Prince Albert to lake Winnipeg. At present all vessels must travel by way of Cumberland lake, as the old channel of the Saskatchewan between the Sipanok channel and the outlet from Cumberland lake is now nearly dry.

LOWERING LAKE MANITOBA.

The desirability of permanently lowering the elevation of lake Manitoba has long been recognized and its consummation earnestly looked forward to by the settlers around the lake. The shores of the lake are generally low and indefinite, and the adjoining lands subject to flooding during periods of high water and, to a considerable extent, even at ordinary elevations of the lake. This is particularly true at the south end, where many thousands of acres are rendered unfit for cultivation.

During seasons of extremely low water much of the land that is ordinarily damaged becomes dry and produces heavy crops of hay. At such times considerable land has been taken up by settlers which afterwards proved to be useless on account of flooding. This has created a strong feeling in favour of reclamation, which has called for considerable investigating of the conditions around the lake. The matter has been several times brought to the attention of the Department of Public Works, and a survey was made at the head of the Fairford river as early as 1880. A second survey was made in 1894, and a third in 1897. The plans of this latter survey are dated 1898, and called for the construction of a canal 200 feet wide by 1,300 feet long across a point on the south side between the lake and river for the purpose of widening the outlet from the lake into the Fairford river. This work was actually proceeded with and the construction completed in 1904. It failed, however, to provide the relief sought for, and another survey was made in 1913-14 with a view to further enlarging the outlet or providing a new outlet as might seem best. At this time three different routes for a canal were examined, one via the Assiniboine river, one via Dog lake to lake St. Martin, and one via the Fairford river. The Fairford river was reported to be the only feasible route. This survey was also made by the Department of Public Works and resulted in the discovery of an all-earth route for a canal along the north side of the Fairford river. The plans of this survey and the report based thereon were

very kindly loaned me by the Winnipeg office of the Department of Public Works. I was also further greatly assisted by the resident engineer, Mr. Sweeney, who sent his assistant engineer, Mr. Stevens, to accompany me on my visit to Fairford in October, 1914.

Lake Manitoba receives the discharge from lake Winnipegosis through the Waterhen river, and itself in turn discharges into lake St. Martin through the Fairford river, which is its only outlet. No gauge records of Waterhen river have ever been kept, but a metering was made in the summer of 1881 by Thos. Guerin, which gave a discharge of 13,630 cubic feet per second. The water was very high in 1881, and this measurement might have been considered a maximum had it not been that Mr. Guerin found marks of very much higher water, from which he estimated the maximum discharge to be 18,642 cubic feet per second. Another measurement of the Waterhen was made on August 26, 1913, by the Manitoba Hydrographic Survey, which gave a discharge of 8,474 cubic feet per second.

During the past three years, twenty meterings have been taken of the Fairford river by the Manitoba Hydrographic Survey at a station which was established in 1912 at the Canadian Northern bridge about 2½ miles east of lake Manitoba. At this station a gauge is read daily by the Manitoba Hydrographic Survey.

The average of	Five	meterings in	1912	gave	7,811 c.f.s.
"	Four	"	1913	"	7,007 "
"	Eleven	"	1914	"	5,310 "

Judging from the gauge records, the maximum discharge during the period of observation was probably around 9,000 c.f.s., but, owing to the effect of wind on lake Manitoba and back-water caused by ice conditions in the river and the effect of a small lake below the gauging station, it is impossible to construct a discharge curve or give a proper value to the gauge readings. The earlier readings were also affected by the construction of the Canadian Northern railway bridge.

It will be seen from the figures quoted above that the discharge from the Fairford river is probably about equal to, or a little less than the discharge from the Waterhen, and the question at once arises as to what becomes of the run-off from the large area surrounding lake Manitoba. The average rainfall for the lake Manitoba region is given at 17 to 18 inches, in the report on Manitoba Water-powers, Water Resources Paper No. 7 of this branch, and it has been suggested that the whole of this is lost in evaporation. The total area of the watershed draining through the Fairford river is approximately 30,000 square miles, of which about 9,000 square miles belongs to lake Manitoba proper. Besides the Waterhen, the only river of any consequence entering lake Manitoba is the Whitemud, which joins the lake at the southwest corner.

While the discharge of the Fairford river during the past three years has probably never exceeded 9,000 c.f.s., there is evidence to show that this is far from being a maximum. A measurement made by Thos. Guerin in 1881 gave a discharge of 14,835 cubic feet per second. In discussing this measurement in a report to the Department of Public Works dated April 29, 1914, it is pointed out that this probably represents a maximum for the Fairford river, as the conditions described by Mr. Guerin indicate very high water. This maximum discharge for the Fairford river contrasts strongly with the maximum discharge given by the same authority for the Waterhen river.

If, then, the maximum discharge for the Fairford river be taken at say 15,000 c.f.s., the problem is to provide for this discharge at lower elevation than at present. The maximum elevation to be fixed for the lake is controlled by the conditions existing at the outlet rather than the requirements of the settlers around the lake. It is possible to lower the elevation of the lake about 2 feet at moderate cost and it probably could be lowered still further at a disproportionate increase in the cost but the underlying rock at the head of the Fairford river and the absence of any very sharp grades in the river near the lake enforce limitations that may not be exceeded within the limit of cost justified by the resulting improvement.

The elevation of lake Manitoba may be taken at 812 feet sea-level datum, at which elevation there is a very considerable area of land surrounding the lake damaged by water. In 1914 the Department of Public Works had a survey made of a portion of the flooded lands surrounding the lake and, by estimating the portion not covered by the Surveyor, arrived at the conclusion that 148,392 acres would be rendered suitable for agriculture if the elevation of the lake were reduced from 812 to 810 feet or, if lowered to 811 feet elevation, about one-half this area, about 74,000 acres, would be reclaimed.

The benefit derived from lowering the lake 1 foot would, at times, be largely regulated by the effect of high winds and, while undoubtedly some sections such as the Dog lake district would be greatly benefited, the results on the whole would prove greatly disappointing.

In the Department of Public Works report of April 29, 1914, cited above, two schemes are outlined. One, for immediate construction, calls for a canal 120 feet in width along the north side of the Fairford river from lake Manitoba to the foot of the first rapids, a distance of 4,100 feet, with a 45-foot cut extending into the lake for towage purposes, and requiring the removal, in all, of 137,000 yards.

The second scheme is simply an enlargement of the first to 300 feet in width and an extension into the lake of 3,400 feet. The total excavation for the 300-foot cut is estimated at 458,000 yards With the 120-foot channel it is expected to lower the lake 1 foot, while the larger channel is thought to be sufficient to lower the lake 2 feet.

The only excuse that may be pleaded for the smaller channel is that it may be completed as an integral part of the larger scheme and, being quickly completed, may afford early, though slight, relief pending the completion of the final work. In order to obtain the relief anticipated from the construction of the small channel it may be necessary to continue the canal full width into the lake until the grade intersects the bottom of the lake. This would have to be excavated eventually, and if not done at first would be certain to shift the point of control from its present position opposite station 70 to a point west of stations 56 and 50. Although the channel is wide here it is somewhat doubtful if the capacity is greater than that required to supply the river as it is at present. This is significant in view of the fact that the 120-foot cut is only auxiliary to the river and not intended to replace it, and the combined capacities of both the river and the canal must pass the shallow area at the outlet from the lake in order that the improvement may be effective.

It is held that with the 300-foot canal in operation, the elevation of lake Manitoba would fall to 809 during the first dry period, and that a return to high-water conditions would not raise the elevation above 810 feet. This conclusion, as well as the conclusions arrived at concerning the 120-foot channel, is based on the records for 1912, 1913, and 1914, but it must be remembered that, although the year 1912 was a year of rather high water, the year 1913 was much lower, and 1914 was a year of very low water, and it is unsafe to base conclusions as to high water on the records for any of these three years, much less the average of the three.. Much higher water than even that of 1912 must be expected. Nevertheless it seems certain that very extreme conditions must prevail in order to cause the elevation of the lake to rise above 810 feet if the proposed 300-foot canal be constructed.

The area of lake Manitoba is about 1,711 square miles, and is therefore capable of providing storage at the rate of 1,512 cubic feet per second for one year for each foot rise in elevation. Under the conditions existing after the construction of the proposed 300-foot canal and with the elevation of the lake stationary at 809 feet, if a wet season should set in in May so that at the end of three months the assumed maximum of 15,000 c.f.s. run-off should be reached, the lake would in that time rise between 6 and 7 inches, and if this run-off continued the elevation would reach 810 feet before the end of five months from the beginning of the wet period; a continuation of these extreme conditions beyond the period of five months, would be certain to flood the reclaimed area, but the season would be over and little damage would result.

It is reasonable to expect that even in the most extreme cases the water would begin to recede before the end of five months, as it would be approaching the season of frost, and unless the rains started early in May they would have to continue into October in order to complete a five-months wet period.

It seems probable that the construction of a canal such as the larger one proposed in the Department of Public Works report cited above would ensure practically a permanent reduction of 2 feet in the elevation of the lake. Since, however, the information regarding the discharge from lake Winnipegosis is so very meagre, and the Fairford records do not cover high-water conditions, it is impossible to say whether the maximum run-off exceeds 15,000 c.f.s. or not. Should it exceed this figure by any considerable amount such as indicated by the estimate of Mr. Guerin in 1881, the capacity of the canal would be greatly overtaxed. In any case this would be a very rare occurrence and not of sufficient importance to justify the construction of a canal with a capacity sufficient to accommodate it.

The only point on the Waterhen river that affords a suitable site for a gauging station is somewhat inaccessible, and there is great difficulty in getting a gauge read. Nevertheless it is very desirable that a station be established there. This might be by the installation of an automatic gauge.

No estimate of the cost of the 300-foot cut is given in the Public Works report, but the estimated yardage is given on the plan at 458,000. If the unit prices given in the report for the smaller cut be applied to this yardage the cost would be $110,500. This does not include the plant which is estimated to cost $50,000. This, if added to the excavation, would bring the total cost up to $160,500 or about $1.08 per acre for the land actually reclaimed, without considering the lands near the present water line that would be improved by being provided with a better outlet.

The interests opposed to lowering the lake are navigation, power development, and fisheries. The interests of navigation are reported to have somewhat declined since the construction of the Gypsumville branch of the Canadian Northern railway. The report above cited states that between 1903 and 1910 the sum of $64,809.05 was expended in dredging thirteen harbours on lake Manitoba. The harbours were dredged for 7 feet with the lake at the elevation of that date, about 812. It is to be inferred from the report that these harbours are now but little used, but no doubt the navigation of the lake will again become important and will steadily increase with the settlement of the surrounding lands. If this be true the lowering of the lake will necessitate much dredging of the harbours as well as at the Narrows and some other shallow points in the lake.

The power possibilities at the head of the Fairford river are not believed to be of very great importance, and should be sacrificed to the paramount interests to be served by lowering the lake.

The fishing interests will not probably be seriously affected except in the matter of navigation and harbours, which has already been discussed under the head of navigation.

In addition to the interests mentioned, the property of the various hunting clubs and those interested in summer resorts at the south end of the lake will perhaps be less advantageously placed with regard to the water. No information is at hand, however, to show whether the damage will be considerable or not.

It has been suggested that the elevation of the lake be maintained at a minimum elevation of 810 feet by the construction of regulating works in the Fairford river. This would be a boon in many respects, but in that case there would probably be times when the canal could not discharge all the run-off and, as there would be no margin for storage on the lake, flooding would result.

There is an urgent demand for the construction of such works as will permanently lower the elevation of the lake at least 2 feet, and the only way to accomplish this at reasonable cost is, as previously stated, by lowering and otherwise improving the outlet

in the Fairford river. In the absence of such permanent lowering, or, as an adjunct to it, considerable benefit might be derived in the district around Dog lake from the construction of a very low dyke to keep back the waters of lake Manitoba during high northwest and southwest winds.

The valuable report of Mr. Stevens of the Department of Public Works, which has been quoted so often in this report, contains much useful information, and the recommendation to construct a canal 120 feet wide is a safe policy for the present. This, however, would only be a good start on the work, and the designs for a complete scheme of reclamation might better be left until the investigations are complete and then be worked out in conjunction with the proposed scheme to lower lake Winnipegosis.

LOWERING LAKE WINNIPEGOSIS.

Within the past few years the rapid settlement of the district surrounding the southern portion of lake Winnipegosis has directed attention to the fact that a very considerable portion of the shoreline is low and but poorly defined and the adjoining land is swampy and liable to flooding at each annual rise of the lake. The area thus affected is believed to be extensive, and the advantages to be derived from lowering the elevation of the lake seem to justify a preliminary investigation into its feasibility and economic advantages.

My instructions called for a reconnaissance of the ground, but the time chosen for this was very unfortunate as the season was extremely dry and the smoke from the forest fires rendered the navigation of lake Winnipegosis extremely difficult, and prevented anything but a most perfunctory examination. The south end of the lake was visited, however, and a trip made down the Waterhen river, which forms the only outlet to lake Winnipegosis, as far as Waterhen lake. It was with great difficulty that a few levels were obtained on the narrow isthmus which separates lake Winnipegosis from lake Manitoba in the vicinity of Meadow Portage. Owing to the smoke it was impossible to obtain any photographs whatever during my visit.

Lake Winnipegosis extends from township 30 to township 48, and from range 16 to 25 west of the principal meridian in the province of Manitoba. It has an extremely irregular coastline, with shores that are low and swampy on the south and west and high and rocky on the east and northeast. A rough approximation of the area that might be reclaimed gave 72,000 acres along one-third of the coastline. Considering that about two-thirds of the coastline is swampy and one-third high and assuming that the northwest one-third is similar to the southwest one-third it would indicate a total of approximately 144,000 acres of low land that might be reclaimed by lowering the lake.

The lake has an area of about 2,000 square miles, with a drainage area of about 21,000 square miles. It discharges into lake Manitoba through the Waterhen river by a very circuitous route. The narrowest point between lakes Winnipegosis and Manitoba is at Meadow Portage, which is situated on the line between townships 30 and 31, in range 16. The loop made by the Waterhen river forms a peninsula which extends for a distance of 25 miles due north of Meadow Portage, and is nowhere more than 5 miles wide. It is therefore considerably more than 5 miles from the Winnipegosis end of the portage to the lake Manitoba end by way of the Waterhen river, while it is only about 9,200 feet across by way of the portage. This peculiar feature has attracted the attention of persons interested in the lowering of lake Winnipegosis for reclamation purposes, as well as those interested in the development of power and the improvement of navigation. The interests of power development and reclamation are opposed, but it is possible to lower lake Winnipegosis to elevation 827, Water Power datum, and still have a head of about 12 feet available for power purposes. A canal that would have sufficient capacity to hold the lake at elevation 827 feet would develop a velocity of about 4 feet per second, or 2·72 miles per hour, which would not be sufficient to

interfere materially with navigation in the canal. The maximum velocity in the canal would probably reach 3 miles per hour which, in a channel 300 feet in width, could be navigated without difficulty for the short distance of less than 2 miles. Should the lowering of lake Manitoba be proceeded with, the relation at present existing between the elevations of the two lakes would not be altered more than 1 foot, and very little loss of power would result from the drainage improvements.

Meadow Portage runs east from lake Winnipegosis across sections 35 and 36 of township 30, range 16, west of the principal meridian. It is the only point at which a canal could be constructed to answer the requirements of either drainage, power development, or navigation. The distance between the lakes at this point is 9,200 feet, and the greatest elevation is about 4 feet above lake Winnipegosis.

While no profile of the Waterhen river was made, it was learned from a trip down the river that there are no sharp grades between lake Winnipegosis and Waterhen lake. It is therefore certain that it would be impracticable to so improve the Waterhen river as to lower lake Winnipegosis the 2 or 3 feet necessary for reclamation purposes.

A survey of Meadow Portage was made and plan and profile prepared by the Department of Public Works in the years 1902 and 1903, with a view to the construction of a canal for purposes of navigation. A survey was also made by the Manitoba Hydrographic Survey in 1913, and a report, plans, and profiles prepared in 1914 with the object of investigating the power situation at Meadow Portage. According to the report made at that time by D. B. Gow, a regulated flow, under 1-foot storage, would yield 10,900 horse-power for seven months. With both lake Winnipegosis and lake Manitoba lowered, it would still be possible to develop nearly 10,000 horse-power.

The lowering of the lake for drainage purposes, while dissipating some of the effective head, would also materially decrease the cost of developing the power by so reducing the elevation of the water in the Waterhen river as to render only a very low dam necessary in the river. As the Waterhen river in its present state of low swampy shores is exceedingly difficult to dam, this is an important consideration. The dam and gates required under reclamation conditions would cost but a fraction of those required under present conditions.

This regulation of the flow of lake Winnipegosis would also greatly assist in relieving the conditions of flooding around lake Manitoba, which might otherwise be somewhat difficult and uncertain.

The short distance across Meadow Portage, the low elevation of the land along the proposed canal route, the seeming absence of rock excavation, and the possible combination of the interests of reclamation, power, and navigation are conditions which render the situation almost ideal from an economical point of view.

Undoubtedly the lowering of lake Winnipegosis would restrict the navigation of the lake and call for a certain amount of dredging at the mouth of the Mossy river, and possibly a few other points, but it must be remembered that such dredging is necessary, under present conditions, to almost the same extent as if the lake were lowered. With the elevation of lake Winnipegosis at 827, Water-power Survey datum, it would only be about 1 foot lower than in the fall of 1914, when dredging was necessary at the mouth of the Mossy river. It is certain that the lake occasionally falls below elevation 828, while under regulation it would never fall below 827, and would probably remain near 828 during the whole season of navigation. This regulation would be an advantage to navigation on account of the limit established, and would require very little if any more dredging than at present.

regulation would be an advantage to navigation on account of the limit established, lumbering and fishing. It is not easy to determine the effect on fishing of lowering the lake, but it would probably be very slight, and the effect on lumbering would also be slight.

The dockage facilities on the lake are very limited and represent but a small outlay, and would be still available under the altered conditions, with but slight improvements. The landing at the town of Winnipegosis is the only one of importance.

It is true that there is at present but little market for power in the vicinity of the proposed development, but the reclamation of the flooded lands around the two lakes would no doubt have a tendency to rapidly increase the settlement and so increase the demand for power. The presence of the supply will create a demand, and no doubt industries will spring up, lured by the temptation of cheap power.

In case both power and navigation interests were abandoned, it would still be possible to lower lake Winnipegosis about 2 feet at a reasonable cost by constructing a canal from a point about three-quarters of a mile west of Meadow Portage to Spence or Deadman's lake. The distance is about the same as the distance across the portage, but the ground surface is much lower and free from trees or brush and the summit is near lake Winnipegosis, which has the effect of reducing the excavation, as the ground along the route is nearly all below the level of lake Winnipegosis. The information concerning this route is very incomplete, however, and it might be found that the outlet from Spence lake to lake Manitoba is insufficient to accommodate the increased flow, although in this discussion allowance is made for a rise of 2 feet in the elevation of Spence lake.

Meadow Portage is somewhat isolated, being 14 miles by water from the town of Winnipegosis at the terminus of the Canadian Northern railway line from Dauphin. There is a wagon road from Winnipegosis to Meadow Portage which traverses the south shore of lake Winnipegosis for a distance variously stated at from 18 to 25 miles, but probably about 22 miles. The distance from the lake Manitoba end of Meadow Portage to Fairford on the Gypsumville branch of the Canadian Northern railway is about 58 miles by water, although in a direct line it is only about 37 miles.

Settlers have taken up a good deal of the land along the south shore of lake Winnipegosis and, in 1914, started in considerable numbers to enter the district farther north near the Waterhen Indian reserve. Some of the land at the portage is of inferior quality, being alkaline through impregnation with common salt. South and west of the portage the land is a low wild hay meadow dotted with islands of brush and small trees. This is characteristic of the south and southeast portion of the lake and along the Waterhen river, which latter flows through a very wide swampy flat overgrown with grass and rushes.

It is not possible to design a canal of the capacity required to lower the lake 3 feet, nor to estimate the cost of such a canal until considerable information has been collected concerning the run-off. So far as I am able to learn, only two measurements have been made of the discharge through the Waterhen river. The first was made by Mr. Thomas Guerin in the summer of 1881 during the prevalence of high water, and the discharge was found to be 13,630 c.f.s., and at the same time the maximum was estimated at 18,630 c.f.s., based on marks found on the trees. In 1913 a measurement was made by the Manitoba Hydrographic Survey, which gave a discharge of 8,474 c.f.s.

No attempt should be made to provide for a discharge of 18,000 feet or more, as such a discharge must necessarily be of such rare occurrence as to make it more economical to suffer an overflow at long intervals than to construct a canal of sufficient capacity to provide for a flood that may not occur oftener than once in twenty-five or fifty years.

A canal 300 feet in width and 8 feet in depth below elevation 827 would, in conjunction with the Waterhen river, have a capacity of about 14,000 cubic feet per second, but could discharge 15,000 c.f.s. without raising the water in the lake enough

to do any damage. For the present, 15,000 c.f.s. may be taken as the maximum discharge of the Waterhen river, but it is desirable that a gauging station be established on the river as soon as possible in order that the much-needed information regarding the discharge be obtained.

SUMAS DYKING AND DRAINAGE PROJECT.

The district known locally as the Sumas prairie is situated in the Railway Belt of British Columbia, about 40 miles east of Vancouver, and stretches from the Fraser river to the international boundary.

During the period of high water in the Fraser river, which occurs annually in the months of June, July, and part of August, the prairie is flooded and rendered for the most part unfit for cultivation. A considerable area of brush- and timber-covered land adjoining the prairie is also injuriously affected by the high water, and the whole comprises about 30,000 acres and forms the Sumas Dyking and Drainage district.

Of this area 11,400 acres still belongs to the Dominion Government. The principal portion of the Government lands form the bed of Sumas lake, which is 9,000 acres in extent, while the remaining 2,400 acres consists of very low lands immediately surrounding the lake.

The soil of this tract is formed of alluvial deposits from the Fraser and Chilliwack rivers and to a lesser extent from the Sumas river, and is very fertile. The idea of reclaiming so desirable a tract was early conceived, but there were many difficulties to overcome and, consequently, nothing has yet been done in the way of construction although many smaller districts along the Fraser river, including the adjoining district of Chilliwack, have been dyked and put under cultivation long since.

Two rivers pass through the district, viz., the Vedder or Chilliwack and the Sumas, and the area drained by these is quite large, amounting to about 620 square miles. Of this area, about 480 square miles is drained by the Chilliwack, and is almost wholly mountainous. To dispose of the water from this drainage area is the chief problem that the promoters of the project have had to contend with.

The Sumas drains a country chiefly of low elevations, and as the area is comparatively small the discharge is not great.

Although the possibility of reclaiming the Sumas prairie was early investigated, and many plans were advocated at different times for bringing about the desired end, it was not until the year 1905 that the "Sumas Development Company, Limited, Act" was passed providing for the election by the land owners in the district of a commission of five members for the purpose of transacting such business as might be necessary to procure the construction of the drainage works. The commissioners elected under this Act secured the services of several eminent engineers who prepared a report in 1909 based on surveys of the district. The scheme suggested in this report was the first one that was in any way adequate to solve the problem of reclamation.

On the basis of this report the work of construction was let to Mr. J. A. Lewis, who, on behalf of the Sumas Development Company, Limited, entered into an agreement with the Crown on July 18, 1905, by which the said company was to receive letters patent to the Dominion lands within the district upon satisfactory completion of the reclamation of the whole area on or before the first day of November, 1908. Mr. Lewis, however, failed to commence operations, and his interests were transferred to the British Columbia Electric Company, who also failed to start construction, although they expended a large sum in surveys and investigations.

On February 8, 1913, the commissioners themselves entered into an agreement with the Crown to purchase at $1 per acre all the Dominion lands within the Sumas district on the condition that the whole area be reclaimed within four years from the date of the agreement. They then, in the same year, let the work to Messrs. L. M. Rice and Company, contractors of Vancouver and Seattle, who agreed to furnish all

the money necessary to complete the works and receive in pay therefor the sum of $385,000, together with the Dominion Government lands. The $385,000 was to be raised on the privately owned lands by assessment. It was confidently expected until after the war broke out last August that the money could be procured in this way, providing certain important alterations could be made in the agreement between the Crown and commissioners. Since the commencement of the war, however, there has been a feeling that no money can be raised on the security of the Dominion lands so long as they remain in the possession of the Government.

The plan of reclamation as prepared by the board of engineers engaged by the commissioners, and as further developed in the plans of L. M. Rice and Company may be summed up as follows:—

1. The exclusion of the waters of the Fraser river by the construction of,—
   (*a*) The Fraser dyke.
   (*b*) The Atchilitz dyke.
2. The diversion of the Vedder river.
3. Control of the waters of the Sumas river,—
   (*a*) By dykes.
   (*b*) By gates.
   (*c*) By pumping when necessary.
4. Control of the interior waters,—
   (*a*) By north and south intercepting canals.
   (*b*) By intermediate intercepting canals.
   (*c*) By a system of interior drains.
   (*d*) By pumping.
5. The construction of suitable pumping plant.

Estimates of the cost of the works have varied greatly, being placed at one time as low as $500,000, but with the lapse of time the estimates increased and the plans proposed by the board of engineers were estimated by them to cost $1,000,000. The L. M. Rice estimates call for the expenditure of $1,500,000 for the completion of the work in accordance with the latest approved plans, and $30,000 per annum for pumping and maintenance.

The elevation of the Fraser river varies from about 73·0 feet to 89·0 feet above Sumas datum, but has been known on one occasion to reach elevation 102·0. The lower elevations occur in winter time and the higher during the summer months, when the snow is melting in the mountains. Sumas lake is but little above the elevation of the Fraser river, and its normal elevation is 79·0 feet, at which height the water is fairly well retained within its banks.

In the design of the works it was necessary to make provision for a return of the flood of 1894, when the elevation 102·0 (the highest known) was reached. This requires that the top of the Fraser dykes be raised to elevation 105, which will introduce an element of serious danger unless the dykes are very solidly constructed and properly located. Fortunately the conditions are such as to permit the Fraser dyke to be located, for the most part, at a considerable distance from the Fraser river and behind a protecting belt of trees and brush.

The applications of the commissioners, dated March 5, 1914, for a revision of their agreement with the Crown under date of February 8, 1913, necessitated a visit to the district, which was made in August, 1914. This permitted me to see some of the most important features and also to make a very brief visit to the neighbouring district of Chilliwack, which is already dyked. My report of December 12, 1914, contains the result of my findings based on my visit and a study of the various reports and plans that have been submitted from time to time.

As previously stated, the most difficult engineering problem to be met is the diversion of the Vedder river, which brings into the flooded district from the outside the drainage from 450 square miles of mountainous country, involving a possible run-off of 25,000 or 30,000 c.f.s. The diversion of this water is estimated to cost one-half of the total cost of all the works required for the reclamation. In my report of December 12, 1914, I have pointed out the desirability of returning this water to the old Luck-a-kuck channel, if possible, and have suggested some slight changes in the proposed Vedder diversion.

The importance of the Sumas district may be understood when it is pointed out that it is already served by an electric railway from Vancouver, the British Columbia Electric, and is intersected on the north by the Canadian Northern Pacific railway, which is under construction. In addition, it comes in touch with navigation on the Fraser, and is connected with New Westminster by a most excellent highway.

The desirability of reclaiming this fine district is patent to all, and there seems little doubt that when the present stringency in the money market has passed there will be little difficulty in securing the necessary funds.

COLUMBIA VALLEY RECLAMATION.

The Columbia river takes its rise in Columbia lake and flows in a somewhat uniform northwest direction for upwards of 200 miles before turning on its long southerly course to the Pacific ocean. From lake Windermere to the canyon at Donald the river proper flows by a tortuous course through a flat which has an average width of about 1 mile, and which is almost entirely covered by the river at extreme high water. The grade along this portion of the river is slight, and it is thought by some that the flow was at one time the reverse of its present direction, or southwesterly from Donald to Columbia lake and thence by way of the Kootenay river. This would be before the breaking away of the rock wall at Donald. The fact that the narrow neck of land between the Kootenay river and Columbia lake is practically level, and that all the tributaries along this stretch of the Columbia river are pointing in a southerly direction supports this view. An attempt was at one time made to turn the waters of the Kootenay river into Columbia lake by the construction of a canal across the flats separating the river from the lake, but the attempt failed as the fall was insufficient. This gave rise to the name "Canal Flats" since applied locally to the section traversed by the canal.

Under average conditions the Columbia river occupies a channel about 200 feet wide, crossing and recrossing the flat and dividing into made side channels and sloughs. The outer banks along the margin of the flats are the benches leading up to the hills while the inner banks are built up by the precipitation from the silt charged waters and are overgrown with brush and trees and are much higher than the adjoining flats on either side.

During June and July, when the snow melts in the mountains, the water rises above the inner banks and flows in all directions over the flats, filling the ponds and sloughs and backing up into Windermere lake. When the flood is at its height the flats are mostly covered with water. This condition continues into August when the flood commences to recede, and by fall the water is usually very low. At this time of the year the sloughs and ponds become practically dry, and navigation on the river is no longer possible.

South of Golden the rainfall is exceedingly light and is totally insufficient for purposes of agriculture or horticulture. The bench lands are therefore extremely dry, and the problem of irrigation has recently been given considerable attention in some sections. As irrigation of the benches is somewhat expensive they are likely to be used mainly for the production of apples and such other fruits as are suitable for growth under the conditions prevailing in the valley. This will tend to create a demand for

the bottom lands for dairy purposes and the raising of feed for stock. This condition has been long foreseen, and the possibility of reclaiming the bottom lands has been much talked of.

In 1913 a company was formed with the object of reclaiming the portion between Golden and lake Windermere, and an agreement was entered into with the Crown on October 8, 1913, for the purchase of all the flooded area belonging to the Dominion Government within the Railway Belt south of Golden on condition that the area be reclaimed within six years of the date of notification of approval of the company's plans by the Minister of the Interior. The filing of the plans was fixed for January 1, 1915, but the time was extended to July 1, 1915. Extensive surveys have been made of the area within the Railway Belt, and the plans are now being prepared.

The intention is to take advantage of the tendency of the river to divide the flats into blocks or units by crossing at intervals from one side of the valley to the other and following close to the line of the benches between the crossings. Thus between two successive crossings of the river, there is a block with the river on three sides and the hills on the fourth side. Such a block will in most cases form a separate unit, with a dyke following the inside bank of the river and having its own pumping plant. The company's engineers are planning to unite some of the smaller units by means of an inverted syphon under the river, with the object of making one pumping plant answer for two units. They also expect to economize in pumping by utilizing such small mountain streams as may be available and suitable for the purpose.

The reclamation of the area in separate units is made possible by the peculiar way in which the river traverses the valley, and while undoubtedly the completed works will be much more costly than if the land could be reclaimed as a single unit, there is considerable advantage to be derived from the fact that a single unit may be reclaimed at small expense and the lands thus made available be used to assist in financing the work on the next unit.

The main line of the Canadian Pacific railway passes through the town of Golden at the northern extremity of the reclamation area, while the Kootenay Central branch of the Canadian Pacific railway from Golden to Colvalli, on the Crowsnest branch, traverses the eastern bank of the Columbia as far as lake Windermere. There is also a good wagon road along the eastern bank from Golden to the town of Athelmere at the northern extremity of lake Windermere. From here there is a wagon road to Cranbrook on the Crowsnest branch of the Canadian Pacific railway. During the summer, when there is sufficient water, there are several steamers plying on the river south of Golden. The auto road from Banff enters the valley at Sinclair and runs south to Windermere. There is at present no road along the west side within the Railway Belt.

The area of Dominion lands possible of reclamation within the Railway Belt and south of Golden is about 13,000 acres. In addition to this there are some privately owned lands that are of no value unless reclaimed. These latter will not pay for the cost of reclaiming unless they are made a part of the larger scheme. Some of this flooded land is held by homesteaders, who are in many cases being given higher lands by the British Columbia Lands Branch, in exchange for the flooded portions of their homesteads.

There is considerable very good bench land along the east side of the valley; and practically all of it has been homesteaded or applied for, and in many cases improvements have been made. On the east side the benches are more precipitous and not so well adapted for agriculture. In some cases water for irrigation is not available.

At present the settlers are mostly of a class who find it necessary to seek work with the Canadian Pacific railway, and in construction camps, with the result that

they have very little time to devote to the improvement of their properties. A few have made improvements of considerable value, and in two or three instances apples have been successfully grown.

The reclamation of the bottom lands should constitute a valuable asset to the valley, and would, no doubt, attract a different class of settlers with sufficient money to enable them to work and improve their land.

As previously stated, the climate is dry, but the bottom lands would probably be sub-irrigated and, in any case, there could be no lack of water at hand, the only trouble being to get rid of it. The weather in summer is pleasant, but there is liable to be extremely low temperatures in winter, and summer frosts are not by any means unknown. As the bottom lands would probably suffer more from frosts than the benches, it might be necessary to grow grasses and other frost-resisting crops to the exclusion of tender fruits and vegetables. Tree fruits could not thrive in the bottom lands on account of the presence of the ground water near the surface.

SILVER CREEK RECLAMATION.

This is a small area to the north of Pitt meadows in the Railway Belt of British Columbia. The Silver creek takes its rise in the hills to the north of township 41 East Coast meridian. It enters township 41 about one and a half mile west of the east boundary, flows through the township from north to south and enters the Pitt river at the southeast corner of the township, near the south end of Pitt lake. At the north end of township 41 the creek flows from a canyon, and enters a low flat area which extends to the Pitt river and forms a wide belt along both sides of the creek. The area subject to flooding comprises about 1,500 acres, exclusive of Siwash island, which extends along the southerly end of the district and itself contains 375 acres.

On February 10, 1911, eleven squatters on this area filed a petition with the Minister of the Interior praying that they be permitted to file homestead entries on the lands occupied by them on the condition that they reclaim the lands by dyking and afterwards perform their homestead duties. They were permitted to do this, but soon found that they could not reclaim the lands by individual effort, and in December, 1913, they petitioned the minister requesting permission to enter into a contract with the Northern Dredging Company for the reclamation of the lands. For financial reasons the proposed arrangement with the dredging company had to be temporarily abandoned.

I visited the district in August, 1914, and found it similar to the bottom lands along the Pitt and Fraser rivers, some of which has been dyked and reclaimed. The soil is excellent, but totally unfit for agriculture in its present condition. It is affected by tides through the Pitt river, and by the overflow of Silver creek, of which latter stream there are several side channels or sloughs cutting the district. The Widgeon slough cuts off an island of 375 acres extent, called Siwash island, from the southerly end of the district. On the west, north, and east it is bounded by precipitous hillsides.

There is no drainage of any account from the east side, but the Silver creek enters from the north and there are three small creeks entering from the hills on the west. There is no information available as to the discharge of the smaller creeks, but the British Columbia Hydrographic Survey have been gauging the Silver creek since August, 1912, and the maximum discharge of 1,023 c.f.s. occurred on the 12th of October, 1913.

It therefore seems a simple proposition to dyke the district along the southerly boundary and both sides of the Silver creek, and pump out the rainfall and seepage. The small creeks referred to could probably be turned to the south and drained into the Pitt river by gravity. It is possible that one of the streams might be used to pump out the interior waters.

The district is only about 18 miles from New Westminster, by water, and about 29 miles from Vancouver by way of the Canadian Pacific railway to the crossing at

the Pitt river, and thence by water. There were no roads into the district at the time of my visit in August last. If a road is built from Coquitlam, as has been talked of, it may be only about 25 miles from Vancouver to Silver creek.

The nearest railway is the Canadian Pacific railway, some 10 or 12 miles distant.

The district differs in some respects from any of the other reclamation districts now under consideration. It is very much smaller than any of the others, and it already has its settlers. Most flooded districts have the problem of settlement to deal with after the work of reclamation is completed, and it is a difficult problem which generally requires a long time to bring to a satisfactory conclusion. The settlers in the Silver Creek district are hanging on by means of a slender foothold which they have, in most cases, on the neighbouring hills. While the hills are generally too rough for cultivation they afford building spots which are not to be found on the flats. There is one house built on the low ground beside the creek, but it was vacant at the time of my visit and it seems hard to believe that it ever could have been habitable.

The settlers must for the most part seek their living away from home, as their land is not cultivable and entirely non-productive. They are therefore not, as a rule, to be found at home, but are either fishing or working at a distance.

The reclamation of the Rannie area, a short distance farther south on the Pitt river, is a good indication of what can be done by dyking and pumping, and proves conclusively that no serious difficulty need be feared in any effort to reclaim the Silver Creek district.

THE MCLAREN PROJECT.

The district covered by the McLaren application is situated in the southern portion of Manitoba east of the Principal meridian, and comprises townships 16 to 19, inclusive, in range 8, townships 12 to 18 in range 9, townships 14 to 18 in range 10, and townships 14, 15 and 16, west of the Winnipeg river, in range 11. The area joins lake Winnipeg on the south, and lies between the prairie on the west, and the Winnipeg river on the east. The southern portion is traversed by the main line of the Canadian Pacific railway and the Lac du Bonnet branch. It is about 45 miles long by 22 miles wide in its greatest dimensions, and forms the connecting link between the level prairie lands on the west and the rough Laurentian on the east, partaking somewhat of the nature of each, and alternating between muskeg, clay, rock, and sand.

The principal portion of the area is, however, classed as swamp lands, of which there are about 241,000 acres.

In the 1914 report of the Forestry Branch on "The Timber and Soil Conditions of Southeastern Manitoba," by Mr. Tilt, the area is described as a "broad muskeg plain, sloping gently to the north and west, with the monotony broken at intervals by gravel and sand ridges." While this description is probably intended to apply more particularly to the district south of the McLaren tract, it is also true to nearly the same extent to the tract itself.

There are no rivers of importance within the district, unless Catfish creek can be so classed, but the Whitemouth lies to the south, the Brokenhead on the west, and the Winnipeg on the east. Within the district, and flowing into lake Winnipeg, are the Catfish creek and Jackfish creek, of which the former is by far the more important, traversing as it does five different townships. Catfish creek flows through townships 18 and 19 in range 8, townships 17 and 18 in range 9, and township 17 in range 10, east of Principal meridian. In township 18, range 8, the creek is 40 to 70 feet wide and passes through the swamps, with solid banks 10 to 40 chains in width. It is used for floating logs in summer.

The problem here presented is somewhat different from any of the projects that are now under consideration. The area is not subject to periodical flooding from the overflow of rivers, but is unable to discharge its annual precipitation owing to the

contour of the country and the impermeability of its subsoil. It is therefore a pure case of drainage without dyking or pumping. On the west side it drains to the Brokenhead river, on the east to the Winuipeg river, and on the north and probably the central portion to Catfish creek.

No survey has yet been made, and consequently no plan for the reclamation of the district can be set forth at present. It will be first necessary to intersect the country by a few lines of levels forming a rough contour and disclosing the chief summits and depressions, which could be then explored and roughly located and the depressions afterwards surveyed, should an examination seem to justify this usefulness.

The country is, for the most part, inaccessible in summer to all ordinary modes of travel, and it is useless to undertake an examination of the district without a properly organized party, with guide and packers. The best time to enter the country is immediately after the swamps are frozen over in the fall, and before the snow gets deep. Should 1915 prove to be a dry season following the dry season of 1914 it might be possible to make a summer survey at no more than the ordinary cost of such work

As stated, the district is largely swamp lands, in fact about 63 per cent is believed to come under this classification. These swamp lands are principally muskeg in their nature and vary from open muskeg and bog lands to heavily timbered muskeg.

The value of muskeg lands depends on the depth and stage of decomposition of the muck deposit, the composition of the subsoil and the facility with which the muskeg may be drained. While such lands were formerly considered useless for purposes of agriculture, recent experiments have demonstrated the fact that, when properly drained, they produce quantities of grass and hay which may be pastured, and the lands much improved thereby. The presence of a clay or clay and sand subsoil within reach of the plough make an excellent combination. Muskeg lands are generally sour, but are rendered productive after drainage by the application of wood ashes or by burning over the surface of the moss covering. In many cases chloride of potash has been found useful, as the deposit is deficient in phosphoric acid, potash, and lime.

The McLaren tract is within easy reach of the city of Winnipeg, and should be quite valuable if found to be easily drained and reasonably productive. In view of this I think the expenditure of a sufficient sum to send a levelling party into the district for about six weeks will be fully justified.

RECOMMENDATIONS.

The information that has been collected regarding the conditions prevailing around lakes Winnipegosis and Manitoba, while very incomplete, is sufficient to encourage the belief that the proposed lowering of these two lakes is entirely feasible and very desirable, especially in view of the possible combination of the interests of reclamation, power, and navigation as cited above. It is necessary, however, that much information be obtained concerning the run-off and the extent and value of the lands to be reclaimed.

There is undoubtedly roo mfor considerable investigation regarding not only the rainfall and surface run-off of the whole district surrounding the lakes, but it is very important that a survey of the underground waters be undertaken.

In this connection it is interesting to note that the discharge from lake Manitoba is generally somewhat less than the inflow received from the Waterhen river alone, which leaves the total rainfall on the lake Manitoba watershed of about 9,000 square miles to be accounted for by evaporation, percolation and transpiration.

It is currently reported that the elevation of lake Manitoba is somewhat independent of the local rainfall, and it has been suggested that both Winnipegosis and Manitoba vary with the elevation of the flood on the Saskatchewan river. Whether this is true or not, the fact remains that there is a remarkable agreement between the

elevations of Cedar lake and lake Winnipegosis. This is all the more noteworthy when it is remembered that Cedar lake is an expansion of the Saskatchewan river and, as such, receives annually the enormous volume of water sent down the Saskatchewan by the melting of the snow in the Rocky mountains. It is therefore evident that a study of the surface flow in the lake Winnipegosis and lake Manitoba watersheds would be very incomplete unless supplemented by a study of the underground flow.

I respectfully recommend a continuation of the investigations commenced in the season of 1914 as follows:—

Carrot River Reclamation.

1. A profile of the Carrot and Saskatchewan rivers, with topography of the banks, within the limits of the flooded district.
2. A reconnaissance of the Carrot River triangle, accompanied by an instrumental examination sufficiently comprehensive to establish a rough contour for drainage purposes.

Lake Winnipegosis.

1. A survey of the alternate route for a drainage canal via Spence lake.
2. Further investigations as to the extent and value of the lands to be benefited, and interests affected by lowering the lake.
3. Investigation of rainfall and run-off, with installation of an automatic gauge on the Waterhen river.

Lake Manitoba.

1. A continuation of the run-off investigations at Fairford.
2. A further investigation of the extent and value of the lands to be benefited, and interests affected by lowering the lakes.

The McLaren Tract.

A reconnaissance accompanied by an instrumental examination sufficiently comprehensive to establish a rough contour of the district.

I strongly urge that these investigations be supplemented by a survey of the underground flow as affecting lakes Winnipegosis and Manitoba, and that weather observation stations be established at Cedar lake and either at the town of Winnipegosis or Fairford.

I have the honour to be, sir,
Your obedient servant,

T. H. DUNN,
Reclamation Engineer.

CANADIAN HYDRAULIC POWER DEVELOPMENT.

BY CHARLES H. MITCHELL, C.E.

M. Inst. C.E., M. Can. Soc. C.E., M. Am. Soc. C.E., Consulting Engineer to Dominion Water Power Branch, Department of the Interior, Canada.

In the presentation of this paper, it is intended to especially deal with the progress in hydraulic power utilization in the Dominion of Canada; to discuss some of the features involved in the design, construction, and operation of hydraulic plants which have found special application, and to incidentally describe a number of typical Canadian power developments.

The Dominion of Canada, lying entirely northward of the United States and stretching from the Atlantic to the Pacific ocean, embraces a variety of climates and a wide range of topographical features which include possibly all favourable and unfavourable characteristics in so far as development of hydraulic power is concerned. The water-powers of the Dominion are almost limitless, and while a great majority are very remote from consuming centres, it is inconceivable, notwithstanding any radical changes in the art of power transmission, that the water-powers would ever be completely commercially developed. The cities of Canada are fortunate in being, without exception, within the zone of economic electrical power supply from hydraulic sources.

Engineers, manufacturers and financiers of the world have appreciably marked influence directly upon the conducting of engineering undertakings in Canada on account of the economic relations of the Dominion with Great Britain, the United States and the continental countries. The bulk of the financing of large works is undertaken in England. While complete mechanical equipment of very high grade made entirely in the Dominion, is obtainable, and the customs tariff levies a duty on imports from all countries, it must be appreciated that the manufacturers of Great Britain, France, Germany, Switzerland, Italy, Sweden, and the United States, are available in Canada on a competitive basis. This is true of practically all machinery and materials, so that in practice it transpires that an equipment may be assembled from many different sources, requiring on the part of the engineer the harmonizing of the designs of these individual parts of varied origin.

While the first half of the last twenty years initiated the radical advances in the whole field of hydraulic engineering, the last decade has been notable for the increase in capacities and efficiencies and for the refinements in design of the various components of the power developments.

It cannot be said yet that hydraulic engineering is approaching a condition possible of complete standardization. Every development shows a combination of features requiring an individual arrangement and design, and it is apparent that within the last few years notable strides have been made with the development of dams, conduits, turbines, regulating devices, and so forth.

Rather than deal exhaustively on one subject or too briefly on all, the general considerations of many of the features and problems of contemporary hydraulic engineering will be undertaken in what follows. It is to be noted that reference is made to the subjects of storage of water for power purposes, and to the ice problems; the former is now engaging the Dominion Government and the governments of several provinces aiming at the improvement of rivers for power and navigation purposes; the problem of the freezing of water has always been a serious one, but it is now almost universally successfully dealt with.

WATER STORAGE.

Storage of water for power purposes by no means presents a new problem, but the application to the immense power projects now existing or under way demands a systematic conservation of water quite beyond the requirements of the past, and introduces many new phases into the question.

The seasonal changes in river flow are very pronounced, as the winter discharge is, in general, retarded by freezing, and in the late summer the combined effect of low precipitation, excessive evaporation, and depletion of natural storage again creates low water, the lesser flow of the two periods definitely determining the economic value of the water-power. The enormous flood flows following the winter seasons are available for but a very short period, but if properly conserved and further augmented by the storage of the surplus of the subsequent rains, the minimum flow can be materially increased and the value of benefited power developments correspondingly raised.

The condition is general in Canada that hydro-electric developments have approached or exceeded the unregulated capacities of their respective rivers, and while very few extensive storage systems are as yet constructed, the activity of industrial expansion now demands that the power developments must anticipate the very near future and fully provide for the securing of maximum available outputs and that every advantage be taken for complete conservation and storage. It is remarkable that practically all Canadian rivers are naturally provided with excellent storage possibilities.

Pondage, differentiated from storage as being the day-to-day storage of water immediately available at the turbines, is an essential in Canadian water-powers as providing an insurance against ice, which, as later described, is a factor commanding the full respect of the engineer. The river flow, due to the controlled discharge from remote storage reservoirs, may not correspond to the variation in power demand during the day, thus further necessitating pondage as an important component to the economic regulation.

The investigation of storage and pondage requirements must fairly establish the load factors of the power supply imposed on the system, the load distribution over the twenty-four hours and, further, the seasonal variation of load as dictated by the nature of the market. The study of the unexploited fields demands an approximation of loads whose character may be assumed by comparison with other existing loads, and it is essential that the inherent load factors applicable to the respective types of loads be fully recognized.

It must be appreciated that effective storage requires relatively large areas of land for flooding purposes, and such lands by growth of population and by the establishment of permanent improvements, increase in value at a rapid rate; at the present time, however, it transpires that the majority of the Canadian storage schemes now under way involve remote forested Crown lands readily adaptable for storage purposes. The multitude of interests involved in extensive storage developments makes the accomplishment of storage in most cases quite beyond the capabilities of the power developing companies, and requires concerted action in the obtaining of the necessary rights. In Canada the respective Government, Dominion or Provincial, which has jurisdiction over water-powers, acts as the intermediary, and this has been a very substantial factor in the notable success of the power situation throughout the country.

The Government of the Dominion of Canada has full control of all navigable and floatable streams and, in addition, through the Water Power Branch of the Department of the Interior, controls all water-power developments and possibilities in the provinces of Manitoba, Saskatchewan, Alberta, and the Northwest territories and the Yukon, and follows a policy of encouraging legitimate enterprise for the development of power resources.[1]

[1] See reports of Water Power Branch, Department of the Interior, Canada.

In the province of Ontario the Department of Lands, Forests and Mines, in conjunction with the Hydro-Electric Commission of Ontario, controls the water-powers on other than navigable streams. The Hydro-Electric Commission is virtually a government commission acting in trust for the various municipalities which have combined for the securing of cheap power; the influence of the Hydro-Electric Commission tends to the development and distribution of power under public ownership. The extent of the operations of this commission is very great and calls for consideration quite beyond the scope of this paper.[1]

In the province of Quebec the Department of Lands and Forests controls the power in provincial waters, and through the Quebec Streams Commission has now under way an immense storage project on the St. Maurice river. Water-powers of the province of New Brunswick are administered by the Provincial Government, but in Nova Scotia a great portion of the land with the included water-powers has passed from the control of the Government, the remaining sites, however, continue under full provincial control. The province of Prince Edward Island is without powers of any magnitude.

It must suffice to briefly describe several Canadian storage developments now under way or contemplated.

In Nova Scotia, about 16 miles from Halifax, a small yet interesting scheme is being developed on the Northeast and Indian rivers which flow into St. Margaret bay on the Atlantic coast. The water available in each of these distinct watersheds is fully conserved by storage dams, and the water from the Northeast river is carried over the intervening height of land to the No. 1 or upper power-house, in which the water under each of the two heads serves a generating unit, the discharge being into Indian lake, at the foot of which the No. 2 or lower power-house is situated with tail-race at tide-water level. By conservation the low summer flow is doubled, thus making such a development a good commercial possibility.

On the Saguenay river, in Quebec, the outlet of lake St. John, which has an area of 350 square miles, there are excellent natural features permitting of an enormous development, the organization of which is now well under way, contemplating an output of 1,200,000 horse-power with an initial installation of 300,000 horse-power, the immense capacity being justified by the very low cost of power in large generating units of 50,000 horse-power each, for the manufacture of nitrogenous products for export.

The Quebec Streams Commission is constructing the necessary works for the storage system on the St. Maurice river which supplies the Shawenegan and Laurentide (Grand'Mère) plants.[2] This system raises the minimum flow of 6,000 cubic feet per second to 15,000 cubic feet per second, the effective drainage area being 16,200 square miles and the reservoir dam at La Loutre impounding 160,000,000,000 cubic feet. This work is undertaken by the commission for the benefit of the present power producers, increasing the power available at the now developed sites by 122,000 horse-power at Shawenegan falls and 63,000 at Grand'Mère, and as an improvement on six undeveloped sites on the St. Maurice, which will thus aggregate 182,000 horse-power capacity; appropriate rentals will be charged the individual users, and the costs assumed by the commission defrayed.

Surveys have just been completed in connection with the storage possibilities on the Winnipeg river, on which two very important power plants have already been developed. The Winnipeg Electric Railway has a plant on the Pinawa channel making use of the Du Bonnet falls;[3] at this plant 26,500 horse-power has been developed. The city of Winnipeg Hydro-electric plant[4] at Point du Bois, about 77 miles northeast of Winni-

[1] See "Electric Power in Canadian Industry." Electrical Section, International Engineering Congress, 1915.

[2] See "Second Report, the Quebec Streams Commission, 1913."

[3] See *Electrical World*, June 23, 1906.

[4] See *Engineering*, London, July 26, and August 2, 1912, also "Canadian Society of Civil Engineers, 1911, Proceedings."

peg, has an installation of eight units aggregating 51,500 horse-power output, the ultimate plant being designed to have an output of 76,000 horse-power. The Point du Bois site has a pondage of about 7 square miles above the dam. The surveys show that the minimum flow on this river may be increased from 12,000 second-feet to 20,000 second-feet by storage to be readily obtained in the headwaters in the Lake of the Woods and the Rainy river and English river watersheds, there being a combined area of 47,000 square miles drained.[1]

The Bow river in Alberta rises in the Rocky mountains and is subjected to climatic conditions, notably severe in river flow, the sources being mountain streams, glaciers, and snowfields. The excellent facilities for power development on the Bow at several locations adjacent to the power market of Calgary and the immediate requirement for regulated flow in the case of the Calgary Power Company at Horse Shoe falls, where the minimum flow of 550 cubic feet per second was not sufficient for the market demands, induced the Dominion Government to undertake the investigation of Bow River storage possibilities, resulting in a survey and report[2] on the whole project and the immediate construction of the reservoir at lake Minnewanka on the Cascade river, a tributary of the Bow, near Banff, and lying within the Rocky Mountains park. An added feature of this reservoir is that the Government proposes the installation of a hydro-electric generating plant which will use the stored water from the reservoir while in transit to the Bow river, and thus secure an ample power service for the town of Banff and the immediate surrounding portions of the Rocky Mountains park, the whole of which has an area of 1,800 square miles, and to a great extent includes all the storage areas required for the Bow River storage system, which will aggregate over 10,500,000,000 cubic feet.

At the present time investigation is under way by the Water Power Branch in the creation of storage for the Athabaska river, which has its source in northern Alberta some miles north of Calgary. This river flows towards the Arctic ocean and, while having its headwaters extending far above Lesser Slave lake into the Rocky mountains, the winter conditions are such that the minimum winter flow is approximately 2,000 second-feet at Athabaska, as compared with the minimum summer flow of over 20,000 cubic feet. The power possibilities on this river are enormous if the flow can be economically regulated and the adjacent markets of Edmonton and the Peace River country—the latter Canada's "Last Great West"—comprise an exceedingly attractive goal.

At the Stave Lake plant of the Western Canada Power Company, situated 36 miles east of Vancouver, B.C., there is an available storage immediately above the power site on Stave lake capable of impounding the complete run-off from the glaciers and snowfields above; this storage reservoir has a total capacity of 14,000,000,000 cubic feet, which will serve the ultimate two power sites at this point. The output of the upper plant is at present designed to be 52,000 horse-power, with 26,000 horse-power already installed.[3]

The Coquitlam-Buntzen plants of the British Columbia Electric Railway Company, situated on tide water at Burrard inlet, have an interesting system of storage, utilizing two adjacent watersheds. The general scheme of development is later described herein. The lake Coquitlam storage, in which the water of the Coquitlam watershed is collected, has a capacity of 7,623,000,000 cubic feet. The rainfall is notably excessive, averaging 156 inches per annum over the last ten years.

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[1] See "Winnipeg River Power and Storage Investigations." Water Power Branch, Department of the Interior, Ottawa.

[2] See "Bow River. Power and Storage Investigations," Water Power Branch, Department of the Interior, Ottawa.

[3] See *Electrical World*, New York, 1912, p. 489.

PROGRESS IN HYDRAULIC ENGINEERING.

Progress in engineering construction and practice can possibly best be described and illustrated by reference to local applications, and it will readily become apparent that Canadian plants have provided a field for, and have demanded, the development of the foremost and most radical advancements in constructional features and equipment.

Turbines.—The notable advance in turbine design has been the attaining of high specific speeds and the making possible of the development of low heads by turbines of large capacities of comparatively high speeds and of a much improved efficiency. The economic utilization of low heads generally resolves itself into a vertical shaft installation, and many persistent objections to the established form of such a construction have demanded radical changes in turbine design.

The single runner vertical shaft turbine has a very important position in Canadian developments. In the Cedar Rapids plant on the St. Lawrence river, near Montreal, the largest wheels of this type are now installed, there being twelve units of 10,800 horse-power under a head of 30 feet at a speed of 55·6 revolutions per minute. At the Grand'Mère development of the Laurentide Company on the St. Maurice river in Quebec, similar units are being installed of 20,000 horse-power capacity under a head of 76 feet at a speed of 120 revolutions per minute. The Cedar Rapids units are much the larger and have a much higher specific speed than the Laurentide units. A few years ago such capacities were beyond the comprehension of the hydraulic engineer.

The commercial efficiencies to be obtained from these modern high specific turbines are remarkably high, approaching 93 per cent and more.

The advantage gained over the multiplication of runners formerly required on one shaft to develop under low head a capacity economically suitable for a hydro-electric installation, are many. The simplicity of a single-gate mechanism; the elimination of submerged gate gears and the torsional effects of the transmitting gate shafts; the small vertical dimensions required conforming more rationally to the available distance between head- and tail-waters; the single-draft tube which may be placed more advantageously; the accessibility of mechanisms for inspection, repair and dismantling; low comparative cost of turbine, of concrete settings and water passages, and of handling, and the possibilities of concrete-formed water passages with smooth curved surfaces and small head loss are all points whose value may be readily appreciated. The disadvantages of the high efficiency being confined to a small load range and the necessity of supporting bearings have small weight in the selection of this type of turbine. The three-quarter load efficiency compares favourably with the maximum efficiency of the lower specific speed turbines. The development of supporting bearings of the Kingsbury, roller and ball types has kept pace with capacity requirements.[1]

Exciter arrangement.—Within the last few years designers have reverted to the arrangement of direct connection of exciter generators to the power unit turbines. While this practice was for long disapproved of, the electrical voltage regulator as now developed has proved its ability to counteract the combined effects of a varying exciter and generator speed when these are direct connected, and within reasonable limits of speed variation, the voltage curve of a power generator may be maintained commercially constant, regardless of load and variation of speed of the turbines. The advantage in generating station and general works design by elimination of duplicated turbine-driven exciter sets is obvious, but it must be remembered that while power units may be self-excited by direct connected exciters, in a station of any magnitude the auxiliary equipment of the plant will demand a source of power available, preferably of direct current, independently of the main power generators. The application

[1] See *General Electric Review*, June, 1914, p. 533.

of direct connected exciters in a large installation is well demonstrated in the installations of the Toronto Power Company's generating station, where the generators, ten in number, aggregating 100,000 horse-power have all been equipped with direct connected exciters; this plant is situated at Niagara Falls, Ont., and transmits power to Toronto, approximately 80 miles distant.

Excitation systems now approach the elaborate and possibly are the most finely adjusted and most fully automatic devices of power plant equipment. The supply of exciting power in the station of 100,000 horse-power calls for generating units of large dimensions, which in themselves compare with the entire capacities of many well-known power plants.[1]

Turbine Speed Control.—Speed control of turbines has in general been required to meet the demand for constant voltage maintenance. The present methods of electrical voltage control are such that voltage need not be considered as the determining factor in turbine speed control; the maintenance of speed to obtain an approximate adherence to the specified electrical frequency instead becomes the important feature. The standardization of frequency to 25 and 60 cycles per second determines the standard speeds for which the turbines are adapted. Variation of frequency in commercial operating practice is not of such great consequence as the variation of unregulated voltage and the demand for extremely quick turbine gate-closing mechanisms has therefore diminished where the voltage is controlled by electrical means.

The closing of turbine gates from fully open in two seconds is now recognized as the standard practice. Regulation of speed during such a period, and until the hydraulic and mechanical factors become normal, is a problem to be solved entirely by proper designing for water supply to the turbine and the inertia storage in the moving parts. The fly wheel, whether separate or incorporated into the electrical generator, is an essential element of the regulation.

Water Passages.—The obtaining of high efficiency and good inherent regulation of turbines requires the greatest refinement in the construction of water passages throughout the whole system. The magnitude of the modern turbine demands large water passages which readily permit of their formation in concrete; the easy curves and smooth surfacing thus possible to obtain has been one of the greatest factors in the attaining of the high efficiencies. As an interesting example of the possibilities of such types of concreted structures, reference may be made to the Calgary Power Company's Kananaskis falls plant on the Bow river in the Rocky mountain foot-hills in Alberta; the form is approximately 24 feet in diameter, made in one complete structure in a convenient place and hoisted into its final position. The form is for one of the 6,000 horse-power turbines, which operate under 70 feet head at 164 revolutions per minute. Attention must also be drawn to the concrete-formed distributor and draft tube in the Cedar Rapids plant.

Surge Tanks.[2]—The development of the surge tank for penstock, and flume regulation has reached a most advanced stage in two recent installations. The first is that of the Ontario Hydro-Electric Power Commission's development at Eugenia falls, Ontario, where the surge tanks are installed on the 4-foot penstocks leading to the power-house, these tanks being placed on their respective pipes near the upper level of the 542-foot head. The second, and most notable example, is at the Ontario Power Company's plant at Niagara Falls, in which the surge tank terminates an 18-foot concrete conduit described herein. The pressure of water during surges is differentiated from the stored water by being carried up in the conduit riser or stand pipe and allowed to overflow through ports, or over the top of the riser if the surge is of sufficient magnitude, into the body of the enclosing surge tank; the stored water as

[1] See Excitation and Voltage Control, *Electrical Journal*, November, 1914, p. 612.

[2] See "Proceedings, American Society of Mechanical engineers, 1908"; "Proceedings, American Society of Civil Engineers, December, 1914."

demanded is drawn into the conduit only through the small ports in the tank which connects with the conduits. Surplus water and overflow water in the tank is discharged to the river by means of a tunnel whose upper length, in the form of a helix conforming to the circular tank wall, the spillway crest of the tunnel mouth being on a level with the riser port discharge level and 4 feet below head-water level at the intake forebay. The regulating action in practice has been excellent, and promises to be a great aid in the practical development of many projected undertakings involving very long pipelines.

Water Conduits.—Several interesting examples of water conduits have been constructed during the last few years. The foremost by virtue of its magnitude and its theory of design is that of the Ontario Power Company at Niagara Falls. This conduit has an equivalent diameter of 18 feet, but it is of a distorted shape, having a horizontal dimension of 19¼ feet and a vertical dimension of 16½ feet, adhering to the natural shape assumed by an elastic tube under its self-contained water and equivalent hydraulic head.[1] The conduit is of reinforced concrete, the bottom being formed first and the upper portion being formed by the collapsible movable forms carried on trucks; the outside forms are bolted to the inner form through iron sleeves which are left in the finished structure and eventually plugged. The inner face was given a permanent hard smooth surface by trowelling to minimize frictional losses. The conduit is 6,500 feet in length and has a rated capacity of 90,000 horse-power at maximum velocity. This conduit is the second installed for this development, No. 1 being of steel and serving the first 80,000 horse-power of turbines[1]; No. 2 conduit serves the 90,000 horse-power turbines since installed. In this generating plant of the Ontario Power Company there is 160,000 electrical horse-power output from fourteen operating units, which makes the plant the largest individual hydro-electric generating plant in the world.

The wood stave pipe as now built for water conduits must be considered a successful type of construction. The half round open sections made of British Columbia fir are quite widely used in Canadian developments and are relied on to give long service if properly constructed. The ease with which the wooden conduit materials, including prepared staves, banding irons, etc., may be transported and erected; the peculiar adaptability to the forming of curves as construction proceeds, and the freedom from penstock ice troubles when operating justify its use in a great many installations. The general experience has been that the rotting of the wood is not a serious factor, and if the conduit is full of water under a pressure sufficient to cause saturation of the staves, rotting is entirely absent. A most interesting development recently completed which has made extensive use of wood stave pipe of various dimensions and type is that of the Canadian Collieries on Vancouver island, British Columbia.[1] The many novel devices for the conducting of water in this hydro-electric installation are well worthy of considerable study as representing, possibly, the most advanced practice in the use of wooden conduits.

Dams.—The concrete dam of the hollow buttress type is in almost universal use where any magnitude is involved. The most notable installations in Canada are possibly those of the Vancouver Island Power Company at Jordan river on Vancouver island; the Canadian Pacific Railway Company's irrigation dam on the Bow river at Bassano, near Calgary, and the power dam at Cole falls on the North Saskatchewan river, built for the city of Prince Albert, Saskatchewan.

The Jordan River dam is on a solid rock base and has a maximum height of 125 feet and length of 800 feet, of which 300 feet is spillway section. The Bassano dam is

[1] See "The Hydrostatic Chord," Proceedings, American Society of Mechanical Engineers, May, 1910; "Stresses in Circular Pipes," *The Canadian Engineer*, November 13, 1913.

[2] See *Engineering News*, October 23, 1913.

See "The Development of the Ontario Power Company," P. N. Nunn, A.I.E.E. Proceedings, June, 1905 and subsequent descriptions published by the O. P. Co.

of three parts, 720 feet of spillway section being of the hollow buttressed type, flanked on one side by 7,000 feet of earth dam and on the other by the concrete headworks structure. The spillway portion is built upon a 14-foot substratum of impervious clay lying on a thick bed of quicksand which comes to the surface some 3,000 feet upstream; the buttresses are carried above the dam to form twenty-four sluice openings fitted with Stoney gates which are of sufficient capacity to discharge 100,000 cubic feet per second maximum flood water. The Prince Albert dam is also built on a clay stratum with sand underlay; the most notable feature of this dam is the length of spill apron used, which is required for the maximum discharge of 180,000 cubic feet of water per second during flood period, the whole crest being used as a spillway and, in addition, this spill capacity is augmented by eleven Stoney sluices discharging through the dam. The dam is 550 feet long extending between a concrete navigation lock and the hydraulic canal intake; the standard height is 29 feet above river bed and the sectional width, including the apron, is 119 feet.

The best Canadian example of the hydraulic fill dam is at lake Coquitlam for the British Columbia Electric Railway Company, supplying the city of Vancouver and its vicinity in British Columbia. The scheme of construction of the Coquitlam dam follows the now well-established principles, the material of a suitably graded nature being sluiced into its final position from the adjacent banks, and the sluicing flumes directed so that the discharge deposits the heavier materials towards the slopes of the dam and the compacted sand, rock dust and clay thus being carried towards the centre by the sluicing water to form the impervious core. The Coquitlam dam impounds the water in Coquitlam lake from which a tunnel, 12,650 feet long through the intervening granite mountain, discharges into lake Buntzen. The initial power development, which is of 43,000 horse-power capacity, has its intake on Buntzen lake with penstocks leading down to the No. 1 power-house. For No. 2 power-house a concrete-lined tunnel leads from an intake on lake Buntzen to a surge tank constructed in the tunnel portal from whence three penstocks are led down the cliff to the power-house, making a head of 400 feet; the turbines in No. 2 plant, as also are those in No. 1 plant, are of the Pelton-Doble impulse type, each of the three units being of 14,000 horse-power capacity under a head of 400 feet. The total installed capacity of the two power-houses is 85,000 horse-power.

Relief valves.—A very necessary adjunct to the long water conduit is the relief valve for discharge of surplus water under the high pressure encountered on the closing of turbine gates and on the consequent surges. The characteristics of operation of relief valves vary over a wide range from spilling water continually to more or less ineffective opening after the building up of a very high excess pressure. The types which act synchronously with the closing of the gates, anticipating the pressure rise by the relative speed of gate closing, have reached a comparative perfection. The continuous spilling of water under normal operation is in general to be termed bad practice, and the high pressure type may sometimes suffer harm before the relief occurs. A bursting plate inserted on the penstock which by destruction under abnormal pressure permits the escape of water until the whole system is shut down and the repair men become active, has its uses in remote cases; the reason for its limited application is obvious.

The relief valve equipment employed on the 20,000 horse-power turbines at the generating plant of the Shawenegan Water and Power Company is to a great extent the result of this company's experience with relief valves throughout the earlier portion of the development. This plant has now installed an aggregate of 147,000 horse-power in No. 1 and No. 2 power houses,[1] the latter having 100,000 horse-power capacity in five units; in addition, the company sells water to customers for utilization in adjacent privately owned plants for the development of 43,000 horse-power. Pen-

[1] See *Electrical World*, May 4, 1912.

stocks approximately 600 feet long and 14 feet in diameter, with a normal velocity of 8·5 feet per second under 145-foot head supply each of the five 20,000 horse-power turbines; each penstock divides into two feeders, one for each of the wheel cases of the respective turbines, and the relief valve is set in the crotch between the feeders and is arranged to discharge from the feeders into the draft tube. The mechanism of the relief valve may be readily understood. The operating shaft is connected to the relief valve dash-pot by levers and lings and the dash-pot piston to the relief valve spindle by yokes and trunnions. The dash-pot is oil filled and the ends of the dash-pot are interconnected by two by-passes cored in the casting one by-pass containing a needle valve and the other a spring check valve operating in only one direction. When the turbine gates are closing the dash-pot moves up, being operated by the gate shaft lever, and should the speed of this movement be such that the oil underneath the dash-pot piston will by-pass through the needle valve to the other side of the piston without building up sufficient pressure to overcome the weight of the relief valve then the relief valve remains closed, while if the movement occurs at such a sufficient rate that pressure is built up to overcome the weight of the relief valve, the valve is opened and tends to close again by return flow of the oil through the check valve. Adjustment is made by manipulation of the needle valve.

In the impulse waterwheel installation at Coquitlam, previously described herein, relief valves operated by the governor are installed. The impelling nozzles are of the needle type; the relief needle nozzle is similar to the power nozzle and is connected to the governor gear so that the relief valve tends to open through the intermediary of an oil pressure dash-pot when the impelling nozzle closes.[1]

Protection against flooding.—Several aggravated cases of power-house flooding due to failure of hydraulic equipment or excessive rise of tail-water, with consequent shutting down of plant and the destruction of electrical apparatus, have had a marked effect on design of stations. Isolation of hydraulic machinery has been obtained in the Shawenegan No. 2 station by a wall separating hydraulic and electric bays, the wall being carried to a sufficient height to accommodate the maximum unimpeded flow through one of the 14-foot penstocks if accidentally discharged into the station, the water finding a vent through the doors and windows, etc. In some stations all exposed doors and windows are fitted up with stop-log seats, a barricade being built up on occasion to protect against outside flood in case of abnormal water conditions. In many instances power-houses can only be economically placed in positions which at very infrequent intervals may be subjected to flood conditions, and while available sources of information in regard to maximum water levels, historically speaking, indicate the safety of the situation, the introduction of a new element in the river courses in the form of power works may greatly affect the normal characteristics of river behaviour. Precautions against the remote possibilities of excessive flood are so easily taken that it is advisable to make all possible provision.

Log Runs and Fish Ladders.—Log runs and fish ladders are peculiar to a great many Canadian developments. Most of the northern rivers are the arteries which tap the timber limits and conveniences for logging are necessitated by the obstructions created by power works. Lumbering is one of Canada's principal industries, and from pioneer days has been controlled and protected by very efficient legislation.

A log run is approached on the upper level by an ample forebay which narrows down to an intake approximating to a V-shaped trough into which the logs can be floated and carried down by a water stream until discharged into the tail-race. Interesting diversions from the usual practice of timber-constructed log runs are that of the High Falls dam on the Lièvre river in the province of Quebec,[2] in which a reinforced concrete V section trough is used, and also that of the contemplated Grand falls development in New Brunswick, which is now under way to supply the city of

[1] See *General Electric Review*, p. 549, June, 1914.
[2] See *Canadian Engineer*, January 7, 1915.

St. John; in this latter plant, due to adverse topographical features, a tunnel is planned to lead from the forebay to the lower river, and will be utilized to carry logs only, the necessary water being admitted at the upper portal of the tunnel. The season during which the logs are moving is usually the spring flood period, when a surplus of water is available for manipulation of logs in transit.

Fish ladders and fish-ways are demanded at the discretion of the Minister of Fisheries in Canada, to be installed in connection with power works which otherwise obstruct the fish channels. Such fish ladders generally take the form of a series of pools built of wooden boxes, the lift on each being about 10 inches and the partition bulkhead between the compartments having a 1-foot square opening through which, in addition to the spill over the tops of the bulkheads, the water passes from the upper level to the lower.

The foregoing subjects, which have appeared to the writer as comprising the outstanding features of Canadian hydraulic power developments from the hydraulic engineers' standpoint, have in their discussion permitted the description of several of tho Canadian plants of greater or less magnitude. Canada is well known as having limitless water-powers, and practically all of those which lie within economic range of markets or are so situated as to be favourable for creation of industry, have been developed in some manner, and at present it is estimated that over 1,700,000 horse-power is developed as hydraulic power, the greater portion of which is converted into electrical energy. In the near future several of the schemes of enormous size now contemplated, and with power units of capacity far in excess of any now developed, will doubtless be realized, and in less than a decade even more notable progression may be recorded than that herein described.

ICE CONDITIONS.

As stated, ice conditions have been a serious factor against the continuous operation of hydraulic plants.

The ice problem is one which has engaged the hydraulic engineer through the whole history of development of Canadian water-power plants. The low temperatures of winter are responsible for the diminution of run-off, the reduction of river areas and the entire freezing-up of small streams. The retention of the greater portion of the winter's precipitation leads to spring flood flows of magnitude many times greater than the normal discharge, while the breaking up of surface ice in spring readily becomes a menace to be guarded against in protecting constructed works. The augmenting of small winter water supply is an economic problem, and the controlling of floating ice and flood water is a problem of recurring operation. The great difficulties, however, in the handling of water under winter conditions are due to the slight changes in the temperature of the water when varying but a small fraction of a degree about the freezing point. It must be realized that the temperature of the water even in the most severe weather does not appreciably vary from the freezing point; indeed it is only by the most delicate thermometers that the variation can be detected, but within a small range of temperature the most distracting troubles may arise.

There are three kinds of ice which are generally recognized: First, surface ice or sheet ice, which forms on still or comparatively still water; second, anchor ice which forms and grows on the beds of rivers which are not protected with surface ice; and third, frazil ice which forms in the agitated water of rapids, falls, and high-velocity channels, and accumulates in great masses in adjacent undisturbed water.

Surface ice may or may not be harmful. The chief trouble is experienced by the total freezing up of small streams and the diminution of the cross-sectional area of the rivers. The ice floes and broken sections when loosed in spring are frequently troublesome through the forming of jams in the water channels thus cutting off water supply or raising the tail water to an extent sometimes disastrous. Further, it must be realized that surface ice in an open stream converts the waterway to a closed channel, and by the

[1] See *Canadian Engineer*, January 7, 1915.

friction imposed by the surface covering transfers the cross-sectional area of maximum velocity to a greater or less depth according to conditions. The velocity factors in stream gauging under such circumstances must, of course, be correspondingly changed.

Anchor ice most often causes trouble by its rising in masses from the river bottom, even rising and carrying stones and boulders of considerable size which have been embedded in the mass. While anchor ice is first formed by the radiation of heat on a cold clear night, this will probably be accompanied by the forming of frazil, the anchor ice becoming the nucleus for the accummulation, such active masses are to be included among the operators' greatest trials.

Frazil ice is the most troublesome, but it is only to be expected where the air temperatures are hovering slightly below the freezing point, and this is a condition to be met at the beginning and end of the winter season or during a changeable period, and after a short experience with it its vagaries may be readily anticipated and the necessary precautions taken. The ice crystals formed by exposure to the cold atmosphere grow rapidly and adhere to one another to form lumps and spongy masses attaching to every cold body it encounters; racks or screens, penstocks, turbines, and all essential parts of water-power equipment are readily affected by enormous accumulations capable of completely closing down the plant. The great majority of power plants have suffered; the modern plant, however, has become more immune from the effects now that a full understanding of the problem is possible.

In selecting the site for power works on a river one must bear in mind the chances for ice troubles. Naturally it is preferable to have large still water pondage immediately above the water intakes; such a provision assures surface ice which will obviate the formation of frazil and anchor ice adjacent to the power works. Unruffled water in the river supply for several miles above the pondage may be expected to reasonably free the lower waters of frazil; this condition is usually readily obtained, as in the damming of the river adjacent rapids or falls are drowned out and the consequent head taken advantage of. The tail-race and lower river must be viewed from the standpoint of ice discharge, and the river course eased sufficiently to preclude any possibility of ice jams. Floating ice may be discharged from the forebay by booms arranged to deflect the ice to ice overflows and runways which may carry it to the tail-race. Ice which may be carried under the boom or screen house curtain so as to accumulate in front of the intake racks has generally to be poled out to the main ice overflow or to a separate runway adjacent to the screens.

It has been found by experience that the source of trouble from frazil ice is its great adhering power to cold bodies in the water. Iron screen racks are much affected when in the presence of frazil; their temperature is but a fraction of a degree below the freezing point. The precautions are obvious. The submerging of iron racks below the surface will ensure their being at the same temperature as the water, and they will not act as conductors of the cold from the air; the top screen section which may extend above the water level may be of wood, which will act as a comparative insulator to the transfer of cold. Iron racks rising above the waterline may be fitted with a housing containing heat supplied by electricity or steam, so that the iron will conduct a small amount of heat throughout its length; the wider application of this is the screen house which is sheltered completely from outside air, and may or may not be heated.

Iron penstocks, and turbines cases, have been known to be completely blocked by frazil ice due to the colder temperature of the iron. The housing-in of all water-carrying equipment is essential where frazil is encountered. The covering of surge tanks to protect against excessive freezing where the surface water is undisturbed for a sufficient period, such as may occur with a continued steady load, is essential.

The problem of housing of penstocks has evolved several practical and economic methods, when burying them is not possible nor desirable. The commonest and possibly the cheapest arrangement is by means of a continuous wooden sheeting having two vertical sides and a sloping or peaked roof, all on a simple wooden framing. A

better arrangement and undoubtedly a more desirable method is by the application of metal lath or wire netting on metal or wooden framing plastered over by cement gun or by hand; the same scheme of covering may be used on surge tanks; these, however, are generally of such magnitude that it is preferable to include them in the architectural featuring along with the power-plant buildings.

The necessary exposure of gates, sluices, stop-log guides, and seats, racks, etc., has required in several cases the installation of steam heating plants, supplying permanently placed steam piping for maintaining freely working equipment, and in the notable case of the Shawenegan plant heated air is blown on the protruding racks, and on the incoming water in the screen house.

ELECTRIC POWER IN CANADIAN INDUSTRY.

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Electricity maintains its commercial supremacy as a source of energy to the general public as a convenience; to the manufacturer requiring a source of power, on account of its adaptability to his respective needs and by its economy in application; in the field of traction, by its operative simplicity, cleanliness, and comparative silence and suitability to frequent short haul; to the electrometallurgist and electrochemist, by permitting of concentration of energy, simplification of processes and equipment, for its uniformity and control of results, and from its application in the production of materials unavailable from any other source. In communication and therapeutics, its field is absolute. Dominating all these elements of industrial power supremacy, cheapness of electrical energy is paramount.

In the study, from the Canadian standpoint, of the use of electric power and its generation and supply it is necessary to analyse the make-up of the typical power load such as may be found to comprise the greater portion of the aggregate loads throughout the Dominion.

In general, a mixed power load consists of domestic, industrial, or power load, municipal service, commercial lighting, and street lighting. The domestic load has by energetic campaigning by the power-distributing companies been constructed into one involving no mean figures; the former incandescent lighting load generally to be found in meagre quantities, even ten or fifteen years ago, has been greatly amplified, so that the unequipped and unlighted residences, anywhere throughout the Dominion within reach of electrical sources, has become the exception; the day load of the many household electrical accessories and conveniences has appreciably added to the consumed power, tending to flatten out the peaked curve of this load and extend the service hours of the distribution system and transformers over a longer remunerative period and, further, to get fuller advantage of power purchased on a peak-load basis. The non-load night hours are now engaging the attention of the central station with the hopes of commercially establishing electric heating accumulators for charging during such hours. As yet it is the experience that lighting and domestic loads create a peak in early evening, unapproached by any other loads on domestic service transformers.

While the domestic service loads cannot be termed industrial loads, the subject this paper is more properly confined to, examples of loads, to be quoted herein, are appreciably composed of domestic loads and in most cases the present power service originated many years ago from the immediate prospect of this market alone, and to-day it is usually the personal aspect and home convenience of electrical power that

carries the great weight in the establishment of a publicly owned system or the granting of service franchises. Directly and indirectly, domestic electrical power service bears a most important relationship with electricity in industry.

For municipal uses such as pumping and street lighting, electricity is universal. Off-peak hour pumping into water reservoirs has proven an economical system when operated as a component of a mixed power load. The enormous strides in application and design of street lighting units, and the great efficiency to be obtained, has placed electrical street lighting far beyond the reach of any other illuminating source.

Electric power in industry has a wide and practically limitless field. As a motive power available in any capacity, conveniently and economically applicable to every class of service, it out-ranks all its competitors, from the rolling mill steam engine reversing its ponderous thousands of horse-power to the infinitesimal foot power of a sewing machine. In the heating and welding of materials, as a part of the process of manufacture, electricity, by its control, speed, and concentration or distribution, enjoys a peculiar field, distinct from either coal or gas.

Electric railways have not reached beyond the industrial, urban, interurban and terminal use. The electrification of trunk lines, which awaits the supply of economic electric power at frequent intervals along the route and the overcoming of the many necessary minor changes in trunk-line operation, besides the enormous capital outlay required, comprise a combination of requirements not considered economically attractive as yet.

Electrometallurgy and *electrochemistry* have been responsible for the handling of materials not workable by any other means, have made available new materials and have greatly cheapened the production of many important materials of wide use. Aluminium, calcium carbide, chromium, cyanamid, silicon, etc., are products only from electrical processes. Alkalies, hypochlorite, phosphorus, magnesium, sodium nitrates, etc., are produced at the lowest cost electrically.

In telephony and telegraphy, in radio-telephony and radio-telegraphy, in radiography and therapeutics, electricity, while possibly thus providing its greatest conveniences and aids afforded to mankind, are not of such power-consuming magnitude as to require further mention.

The source of electric power for commercial purposes is motive power produced by steam, oil, gas, or water. In Canada it is notable that, without exception, all cities are now supplied by, or are within the economic distribution zon eof hydro-electric sources; and, further, commercial conditions are such that power from these sources is available to the consumer at very attractive rates, and it is apparent that the future of power-consuming industries has its foundation in the bountiful and widespread water-power resources of the country.

The Dominion of Canada has an area of 3,745,574 square miles stretching from the Atlantic to the Pacific and from the northern boundary of the United States to the Arctic ocean.

The Northwest Territories, the vast northern portion of Quebec, and the greater part of the Yukon cannot be considered, within our generation, to be factors in the industrial field. The possibilities in these districts from the standpoint of natural resources are not, as yet, with the incomplete investigations made up to the present, capable of appreciation; water-power is plentiful, but so remote from any present market that the capacities of the thousands of known water-powers are not included in statistics; within a limited area, the Yukon is an exception. In the provinces of Nova Scotia, New Brunswick, Prince Edward Island, Quebec, Ontario, Manitoba, Saskatchewan, Alberta, and British Columbia, power is available in great abundance.

Nova Scotia water-powers are, in general, of small dimensions as a result of the limited drainage areas and the low available heads on the various rivers due to the general topography of the country. New Brunswick has many rivers of magnitude, but with gradual drop and small facilities for storage. Prince Edward Island is very

limited in water-powers, there being no site capable of development of over 100 horse-power. Quebec and Ontario and the eastern and northern portions of south Manitoba have enormous possibilities in power production, while the western part of Manitoba, southern Saskatchewan, and southeastern Alberta are quite limited in capacities, being the prairie wheat-growing "west" of Canada. The Rocky mountains and eastern foot-hills in Alberta provide a notable source of power, and the province of British Columbia, comprising the western slope of the Rocky mountains to the Pacific ocean, is capable of enormous water-power development.

Within the provinces of the Dominion of Canada, and excluding the Northwest territories, practically all of the Yukon, and the northern and eastern portion of Quebec, it is estimated that 17,764,000 horse-power is available, this amount being inclusive, in the case of Niagara Falls, Fort Francis, and the St. Marys river at Sault Ste. Marie, of only the development permitted by international treaties, and further does not contemplate the full possibilities of storage for the improvement of capacities. The developed powers which are inclusive of all water-powers, whether for electrical production, pulp grinders, for milling or for the great many other uses, aggregate 1,712,193 horse-power as developed by turbines, and this amount is distributed over the provinces as shown in the following table:—

Province.	Horse-power Developed.
Nova Scotia	21,412
New Brunswick	13,390
Prince Edward Island	500
Quebec	520,000
Ontario	789,466
Manitoba	56,730
Saskatchewan	45
Alberta	33,305
British Columbia	265,345
Yukon	12,000
Total	1,712,193

The relation between population and water-power developed makes a very interesting study. It cannot be said that a definite relation exists or should exist, although it is possible that in the future as the rapidly changing commercial conditions assume a permanent stability from established markets and universal demand, a constant may be deduced for the equation, the variables being environment, government policy, inherent commercial instinct, natural resources of materials, accessibility of market and, above all, available sources of low-cost electric power.

Horse-power per capita of the various manufacturing countries may be compared on the present standing, and while the contemporary industrial conditions may not readily admit of the projection of these values to the next few years to come, in the commercial future of the world it must be recognized that cheap power will be the key-note of industrial advancement.

Country.	Area Square Miles.	Population (Latest available figures.)	Horse-power available (1915 estimate.)	Horse-power developed, (1915 estimate).	Per cent utilized.	Horse-power per Square mile of Area		Horse-power per Capita.	
						Available	Developed.	Available	Develop'd
United States	3,026,600[1]	92,019,900[2]	28,100,000	7,000,000	24·9	9·3	2·31	0·31	0·076
Canada A	2,000,000	8,033,500	17,820,000	1,710,843	9·6	8·91	0·86	2·22	0·21
Populated B	927,800	8,000,000	8,094,000	1,700,000	21·0	8·74	1·83	1·01	0·21
Austria-Hungary	241,330	49,418,600	6,460,000	566,000	8·8	26·8	2·34	0·13	0·011
France	207,100	39,601,500	5,587,000	650,000	11·6	27·0	3·14	0·14	0·016
Norway	124,130	2,302,700	5,500,000	1,120,000	20·4	44·3	9·02	2·39	0·487
Spain	194,700	18,618,100	5,000,000	440,000	8·8	25·7	2·27	0·27	0·024
Sweden	172,900	5,521,900	4,500,000	704,500	15·6	26·0	4·08	0·81	0·127
Italy	91,280	28,601,600	4,000,000	976,300	24·4	43·8	10·7	0·14	0·034
Switzerland	15,976	3,742,000	2,000,000	511,000	25·5	125·2	32·0	0·53	0·137
Germany	208,800	64,903,400	1,425,000	618,100	43·4	6·8	2·96	0·02	0·010
Great Britain	88,120	38,802,500	963,000	80,000	8·3	10·9	0·91	0·02	0·002

anada "A" 2,000,000 square miles taken as the area treated Conservation. Commission's estimate of available water-power, and the area which we may expect to see fairly thickly settled during the next few decades, 3,729,700 square miles—area of whole Dominion.

[2] 1911 Census 12 per cent.

[1] Excluding Alaska (area about half million square miles).

As statements from official sources, or as computed from all accessible sources of information, the amounts of water-power available and developed and the horse-power per capita have been compiled and are here presented for the various industrial countries of Europe and America.

No uniform method of obtaining the figures of horse-power available has been employed, information as to the extent of possible storage in the respective cases not being available and, further, these amounts may be the aggregate of individual estimates as in the case of Canada,[1] or estimates of district totals as in the case of United States,[2] both of the latter cases, moreover, do not include maximum economic storage, and include only such power plants as may reasonably be included within the range of market in the near future.

Notwithstanding such possible discrepancies in the compilation of available power, the developed power has permitted of close totalling and thus, with population,[3] gives reliable figures for the horse-power per capita.

While the United States leads in available capacity and in power developed, and Norway leads in power developed per capita, available power in Canada is enormous and the developed power now ranks second in amount developed and in amount per capita. The distribution of available power in Canada adjacent to the natural resources and to the transportation routes ensures the continuation of rapid development, there existing every indication that the rate set between 1911 and 1914 of an increase from 1,016,521 horse-power developed to 1,711,188 horse-power developed will be readily maintained.

Twenty years ago the position of the various manufacturing countries, in the scale of industrial production, undoubtedly bore a direct relation to the consumption of coal, and power was a major factor in industry. In the present day, where so many factors are in a transition stage, it cannot be said that either coal consumption alone or water-power developed alone is indicative of commercial standing, although the aggregate power equivalent may do so. All such studies of power economics, however, will disclose that low-cost power is the underlying element of the industrial world.

Fortunate as is Canada in water-power distribution, the added advantage of a great share in the world's mineral resources with, moreover, the proximity of power to the mines, will by their interdependence provide a great stimulus to the development of both. Coal, iron, copper, nickel, gold, silver, cobalt, lead, asbestos, mica, and corundum are the principal minerals, and the output value of these, aggregating $186,802,406 in 1910, is one of the chief elements in the commerce of the Dominion.

The appreciation of low cost of power is relative only: relative in the first place to our ideas of absolute cost of commercial power as produced, possibly, by the steam engine; and secondly, low cost, relatively, when cost of power as a major factor in production is lower than the critical power cost at which manufacture becomes commercially feasible. We are apt to think of low cost of power as something tangible and absolute. Under certain conditions, steam power at $100 per horse-power per year is low-cost power, and under certain conditions power at $6 per horse-power per year is high-cost power; $6 power may show a loss in an extensive electrochemical plant, while $5 power may show an attractive profit.

In general, low-cost power is considered by the majority to be synonomous with hydro-electric power. The constituents of power cost may be readily analysed. In a hydro-electric generating plant, charges against capital—the aggregate of interest, sinking fund to retire bonds, depreciation fund, taxes and insurance, etc., go to make up the greatest portion of the total cost; water charges, if any; operation, maintenance, and supplies are, in general, the minor items. In the steam plant the cost of fuel alone will generally greatly exceed capital charges, while capital cost of a steam plant may

[1] "Water Powers of Canada," Commission of Conservation, Ottawa, 1911.
[2] "Forest Service, Department of Agriculture, United States.
[3] Population compiled from Encyclopædia Britannica, 11th edition.

readily compare with the capital cost of an electrical generating plant. In the steam plant the greater the capital cost properly expended the greater the over-all efficiency, and thus the increase in the minor factor of capital charge may provide a more than proportionate decrease in the major item of fuel. In the hydraulic plant, efficiencies are practically standardized and fixed; capital charges, however, greatly vary from many causes within the wide limits of a low-cost plant with a head of several hundred feet, with small headworks and a small number of large capacity generating units, to the high-cost plant with low head, with extensive construction and a multitude of small units.

Quality of power is an element in the cost of an hydro-electric plant. In the supply of industrial power, continuity of service and more or less adherence to a definite standard of electrical characteristics of the supply are the essentials of quality. Absolute continuity is impractical, and the safeguards required in securing even an approximation of continuity in generating plants and transmission and distribution system is usually so costly as to prohibit cheap power. The electrical characteristics of voltage and frequency, as representing the factors of greatest appeal to the consumer, are dependent on design and operation, and their maintenance is readily to be obtained.

In the electrochemical and electrometallurgical field the lowest-cost power only can be entertained, and such is available only from the largest of plants; power at from $6 to $10 per horse-power per year must be the aim to secure such a market.

While abundance of water-powers exist in Canada to-day, only the most cautious governmental administration policies can provide for the anticipated requirements of the future. The majority of water-powers within market range will undoubtedly be developed, and the future is one of vital importance.

It has been fortunate that, in Canada, the water-power rights have mostly remained in the control of the Dominion or Provincial Governments. The Dominion Government controls navigable streams and their water-powers throughout the Dominion, and the water-powers of the provinces of Manitoba, Saskatchewan, and Alberta, the Yukon and the Northwest territories, Quebec, and New Brunswick have granted powers heretofore on broad leases, while Nova Scotia has many of its water-powers privately owned outright from eighteenth-century Government land grants; these provinces are now planning much more efficient control. In the province of Ontario the administration has become of such exceptional nature that it is worthy of a very complete study, as being possibly the greatest of municipal power undertakings.

The Dominion Government administration policy affords every reasonable protection to the public as to rentals, periodic revisions, control of rates, limited grants, etc., and at the same time fosters legitimate private enterprise to return reasonable profits. Regulations are in force affording all possible assistance to the development of water-powers which have every reasonable assurance of economic utilization and, further, before the authorization to proceed with development is given, complete investigations are undertaken to prove the economic features of design, capacities, and costs, and eventually supervision is carried out during construction. Proper government supervision and control of the construction and maintenance of all developments is the only safe method of intelligently initiating construction and maintaining an adequate system of river improvement for power purposes.

The Hydro-Electric Commission of Ontario has created a world-wide interest in an experimet of publicly owned power. The history and results of the undertaking deserve fullest consideration in dealing with electric power in Canadian industry.

For some years previous to 1906, several of the energetic and leading citizens of central southwestern Ontario had endeavoured to secure a working basis for a comprehensive scheme of supplying power to the various municipalities, the city of Toronto comprising the largest interests in the matter. In 1906 the Provincial Government created a commission empowered to investigate power conditions every-

where in the province, and a further commission was established after the rendering of the preliminary reports on the situation which resulted in by-laws on the question of power supply being voted upon by the interested municipalities, and an agreement was entered into by the cities and towns of Toronto, Hamilton, London, Brantford, Guelph, Stratford, St. Thomas, Woodstock, Ingersoll, Berlin, Galt, Toronto Junction, Hespeler, St. Mary's, Preston, Paris, Waterloo, New Hamburg, and Weston with the Hydro-Electric Power Commission of Ontario for a supply of electric power to be transmitted from Niagara Falls. The commission is empowered by Act of Parliament to make expenditures for the carrying out of the necessary work, and these expenditures are repayable to the commission by the municipal corporations which have entered into contracts. The price per horse-power per year that each municipality has to pay for the respective block of power is the cost to the commission and, in addition: (*a*) interest at the rate of 4 per cent upon the moneys expended by the commission on capital account in the construction or purchase of works; (*b*) an annual sum sufficient to form in thirty years a sinking fund for the retirement of the securities issued by the province under the Act for the payment of the cost of the works; and (*c*) line loss and the cost of operating, maintaining, repairing, renewing, and insuring the works. The amounts payable are annually adjusted and apportioned.

Tenders are called for the supply of electrical power from the producing companies at Niagara Falls, Ont., and in March, 1908, the commission entered into a contract with the Ontario Power Company for amounts up to 100,000 horse-power. Power was obtained from this source at the price of $9.40 per horse-power per annum for amounts up to 25,000 horse-power, and when the power demand exceeded 25,000 horse-power the prices became $9 per horse-power per annum. This price is for 12,000-volt 3-phase, 25-cycle power delivered in the commission's transformer station in Niagara Falls.

In addition to the district served in the Niagara system, the commission buys power from the Kaministikuia Power Company of Fort William, Ont., and sells to the city of Port Arthur from the Ottawa and Hull Light and Power Company, selling to the city of Ottawa; from the Auburn Power Company, selling to the city of Peterborough; and from the York and Ontario Power Company for selling to the group of towns in the St. Lawrence system. Further, the commission purchased the generating and distributing system of the Simcoe Railway and Power Company at Big Chute on the Severn river, and made considerable extensions to the distribution system, this plant being arranged to tie in with a generating plant being built by the commission at Eugenia falls, where a 542-foot head is to be obtained, and which is to supply power on June 1, 1915. A generating station and distribution system has just been completed at Wasdell's falls on the Severn river at the outlet of lake Couchiching to supply power to the Wasdell's falls system. The commission is at present engaged on the preliminaries to construction of radial electric railroads in the vicinity of Toronto, and has undertaken the engineering and construction of the electrification works of the London and Port Stanley railway.

A reference to the map will well show the extent of the distribution area served by the commission, excluding the Port Arthur, Ottawa, and St. Lawrence systems. The transmission lines to-day aggregate 395·7 miles of double-circuit 110,000-volt line; 37 miles of single-circuit 110,000-volt line, 722 miles of single- and double-circuit pole lines of voltages from 13,200 up to 46,000; and 77 miles of low-voltage circuits. All the 110,000-volt lines and the greater portion of the others are included in the Niagara system.

On December 31, 1914, the number of customers served by the system was 96,744. on February 28, 1915, the power purchased by the commission was over 100,000 horse-power.

Three features are outstanding: first, the power is intended to be available for every class of consumer, rural or urban; second, the equipment and general design

is selected for most permanent and effective service; third, the power is supplied to the municipalities at cost.

Being assisted by complete effective legislation from both provincial and municipal standpoints, these operations of the Hydro-Electric Power Commission are the broadest examples of municipal ownership. The field entered by the commission, wherever established municipal plants did not previously exist, was quite fully covered by private companies.

The adverse criticism which a publicly owned electrical power system must expect when entering an established commercial market was based, at the inception of the commission's plans, on the monopolistic tendency, on the possible effects of the introduction of provincial party politics, and on the experimental nature of the scheme. The entire success as a commercial system, as an engineering work, and as a popular undertaking has entirely vindicated the situation.

The sale of power at cost eliminates much competition. This cannot be said to be creating a monopoly, as several of the established companies were able to reduce their rates to a corresponding amount and, with the decidedly less remunerative rates have been able, by a much increased activity in the handling of business, to maintain a sound financial existence. The popular idea of the effect of a monopoly is that the public pays more and gets less in return, a condition certainly not comparable with the commission's enterprise.

The selection of the personnel of the commission has been a very judicious one, quite beyond criticism from the party standpoint, and to these men, of whom Sir Adam Beck, K.B., has been the chairman from the beginning, must belong much of the credit for the present position.

The experimental features of the engineering and commercial problems involved, particularly, long distances, it being 233 miles from Niagara Falls to Windsor; the fact that 110,000-volt transmission at the time designs were commenced was in its earliest stages; that power was to be available to the municipalities at 25 cycles for use in established markets using 60 cycles and 133 cycles; the necessary duplication in many cases of distribution systems; published power prices were based on estimates only, of cost of construction and distribution; large blocks of power with corresponding prices were apportioned to the respective municipalities considerably in excess of their needs at the time and, in reality, in most cases in excess of the power consumption from all sources of steam, water, gas, and oil; an appreciably leavening factor was to be introduced into the industrial rivalry of the various communities; the consideration of an aggregate load of 100,000 horse-power, as was anticipated, and which was to be an element in the ultimate success, was beyond the comprehension of the great majority; and possibly, lastly, no apparent provision was made for the development period in acquiring the load contracted for.

The analysis of the foregoing is quite beyond the capabilities of this paper. In 1908 the municipalities entering into the agreement subscribed for 29,335 horse-power; distribution of power was commenced in 1910; in 1915 the power will be in excess of 100,000 horse-power in the Niagara system alone. These figures may broadly suffice in place of a complete analysis, as each of the problems enumerated was eventually met by a successful solution.

The municipalities originally included in the power agreements numbered fifteen; on February 28, 1915, this number had increased to eighty-two, and the growth in the number of consumers is well shown in the following table:—

—	1912	1913	1914	Approximate number of consumers (to December 31, 1915
Light	33,568	63,157	93,179	
Power	1,399	2,532	3,565	
Total	34,967	65,689	96,744	

The total cost of the Niagara system of the commission to October 31, 1914, is as follows:—

Transmission Lines—		
Right of way	$ 574,806.67	
Steel tower lines	2,095,050.23	
Telephone	129,706.69	
Relay system lines	54,537.32	
Conduit systems, Ontario Power Co., to Niagara station	66,844.67	
		$ 2,920,945.58
Windsor Extension (Operating, 1915.)—		
Right of way	195,060.87	
Steel tower and telephone lines	835,734.97	
		$ 1,030,795.84
Duplication of Transmission Lines, Niagara to Dundas (Operating, 1915)—		
Right of way	$ 47,264.25	
Steel tower and telephone lines	258,305.92	
		$ 305,570.17
Wood pole Line in operation	$ 1,047,924.46	
Wood Pole Lines in course of construction	191,572.20	
		$ 1,239,496.66
Welland and St. Catherines District lines		8,239.20
Rural Line construction		159,382.23
Transformer Stations—		
Stations in operation	$ 1,905,352.25	
Stations and extensions in course of construction	342,080.83	
		$ 2,247,433.08
Distribution stations in operation	$ 86,674.65	
Distribution stations in course of construction	5,138.18	
		$ 91,812.83
Total		$ 8,003,675.59

The aggregate of the annual cost of operation, capital charges, up-keep, etc., of the municipal systems is as follows for the years 1912, 1913, and 1914:—

—	Dec. 31, 1912	Dec. 31, 1913	Dec. 31, 1914
Number of municipalities included in report	28	45	69
Operating and maintenance expenses	$ 1,086,135.00	$ 1,511,048.00	$ 2,012,754.07
Debenture charges and interest	291,033.00	479,995.00	661,949.23
Total annual expense	1,377,168.00	1,991,043.00	2,674,703.30
Total revenue	1,617,674.00	2,611,918.00	3,433,936.16
Gross surplus for year	240,506.00	620,875.00	759,232.86
Depreciation charge	179,847.00	230,480.00	357,883.31
Net balance, profits in excess of depreciation	60,659.00	390,395.00	401,349.55
Total plant value	6,349,711.00	9,196,483.00	12,901,125.43
Net debenture debt and overdraft	5,882,156.00	10,468,351.78	12,702,689.81
Accumulated gross receipts invested in plant extension	.....	861,381.00	1,601,167.42
Accumulated depreciation reserve	.....	410,327.00	850,618.07
Net surplus from operation	.....	451,054.00	750,549.35

The assets of the sixty-nine municipalities in the system up to December 31, 1914, were:—

Lands and buildings	$ 791,732.20
Sub-station equipment	1,476,087.84
Distribution system, overhead	3,422,763.93
" " underground	807,153.53
Line transformers	787,613.52
Meters	1,172,475.11
Street lighting equipment, regular	1,071,255.37
" " ornamental	270,386.55
Miscellaneous equipment and construction equipment	2,062,035.90
Steam or hydraulic plant	420,108.33
Old plant	478,881.56
Other miscellaneous assets	140,631.56
	$ 12,901,125.40

Table No. 1 shows municipal power rates for the year 1914, and covers cost to municipality per horse-power per year, power rates, domestic and commercial lighting, and street lighting.

The rates at which the commission sells to the municipality consider the distance from the Niagara or other generating source, cost of 110,000-volt and 13,000-volt local

TABLE No. 1—Municipal Rates, 1914.

Municipality.	Cost of power to municipality per h.p. per year.	Lighting Rates.				Power Rates.						Street lighting.
		Domestic		Commercial		Prompt payment discount.	Per h.p. per month.	1st 50 hr. per month per kw-hr.	2nd 50 hr. per month per kw-hr.	All add'l per kw-hr.	Prompt payment discount.	
		Per 100 sq. ft.	Per kw-hr.	1st 30 hr. per kw-hr.	All add'l per kw-hr.							
	$ c.	c.	c.	c.	c.	%	$ c.	c.	c.	c.	%	$ c
Acton	36 00	4	5	10	5	10	1 00	4·3	2·9	0·4	10	15 00 per 100-w. incan.
Ancaster	Served by Dundas	4	5	10	5	10	1 00	3	2	0·25	10	14 00 "
Baden	32 00	4	4·5	9	4·5	10	1 00	2·8	2·5	0·3	10	12 00 "
Barrie	33 70	4	4·5	9	4·5	10	1 00	5 6	2·4	0·3	10	12 00 "
Beachville	31 00	4	5	10	5	10	1 00	3	2	0·25	10	10 00 "
Beaverton	Note A.	3	4	8	4	10	1 00	3·6	2·4	0·3	10	13 00 "
Berlin	21 50	4	3·5	7	3·5	25	1 00	2·1	1·4	0·2	10	9 00 "
Brampton	25 00	4	3	6	3	20	1 00	2·8	1·8	0·2	10	8 00 "
Brantford	19 50	4	3	6c. 1st 30 hr. 3c. next 70 hr.	0·15	10	1 00	1·9	1·3	0·15	10	8 00 " 40 00 Magnetic arc.
Bullock's Corn. and Greensville.	Served by Dundas.	4	4	8	4	10	1 00	2·8	1·8	0·25	10	12·00 100-w. incan
Caledonia	24 00	4	4	8	4	10	1 00	3·7	2·5	0·3	10	12 00 100-w. incan.
Cannington	Note A.	3	4	8	4	10	1 00	3·6	2·4	0·3	10	13 00 "
Chesterville	44 43	4	5	10	5	10	1 00	4·2	2·8	0·3	10	13 00 "
Clinton	41 00	4	5	10	5	10	1 00	4·9	3·3	0·4	10	12 50 40-c.p. incan.
Coldwater	28 00	4	4	8	4	10	1 00	3·2	2·1	0·3	10	12 00 100-w. incan.
Collingwood	33 97	4	4·5	9	4·5	10	1 00	3·6	2·4	0·3	10	12 00 "
Creemore	54 00	4	7	14	7	10	1 00	6·4	4·3	0·5	10	12 50 "
Dundas	15 00	4	3	6c. 1st 25 hr. 3c. next 75 hr.	0·15	10	1 00	1·6	1·1	0·15	15	9 00 "
Elmira	38 00	4	5	10	5	10	1 00	4·7	3·1	0·4	10	12 00 "
Elmvale	31 00	4	4·5	9	4·5	10	1 00	3·6	2·4	0·3	10	12 00 "
Flora	33 97	4	4·5	9	4·5	10	1 00	3·9	2·6	0·3	10	12 50 "
Fergus	33 97	4	4·5	9	4·5	10	1 00	3·9	2·6	0·3	10	12 50 "
Galt	21 50	3	2·5	6	2·5	10	1 00	1·9	1·3	0·15	25	8 50 "

Georgetown	36 00	4	5	10	5	10	1 00	4	2·7	0·3	10	12.50 "
Glen Williams	Served by Georget'n	4	6	12	6	10	1 00	4·3	2·9	0·4	10	14·00 "
Goderich	37 00	4	4·5	9	4·5	10	1 00	4·8	3·2	0·4	10	15.00 80-c.p. incan. 55.00 3-lt. standard 40.00 1 " 25.00 1 "
Guelph	21 00	4	4	8	4	25	1 00	2	1·5	0·2	25	9.00 100-w. incan.
Hagersville	33 21	4	4·5	9	4·5	10	1 00	3·9	2·6	0·3	10	12.00 "
Hamilton	15 00	4	3	6c. 1st 25 hr. 3c. next 75 hr.	0·2	20	1 00	2·1	1·4	0·2	25 & 10	8.00 " 13.75 250-w. " 50 00 500-w. nitrogen-filled on stand.
Hespeler	23 00	4	4·5	9	4·5	10	1 00	3	2	0·25	10	12.00 100-w. incan.
Ingersoll	25 50	4	4	8	4	10	1 00	2·8	1·8	0·2	10	12.00 80-w. " 12.50 100-w. "
London	23 00	4	3	6c. 1st 30 hr. 3c. next 70 hr.	0·6	25	1 00	2·5	1·7	0·2	10	11.00 75-w. " 12.85 100-w. "
Midland	19 45	4	3	6	3	10	1 00	1·7	1·1	0·15	10	13.50 " " 35.00 500-w. arc.
Milton	28 00	4	4	8	4	10	1 00	3	2	0·25	10	9 00 100-w. incan.
Mimico	30 00	4	4	8	4	10	1 00	3·3	2·2	0·3	10	11 00 "
Mitchell	37 00	4	4	8	4	10	1 00	4·2	2·8	0·3	10	12.00 "
New Hamburg	32 00	4	4	8	4	10	1 00	3·8	2·5	0·3	10	9.00 "
New Toronto	28 00	4	4	8	4	10	1 00	3	2	0·25	10	12 00 "
Norwich	32 00	4	4	8	4	15	1 00	3	2	0·25	10	12.00 " 9 00 60-w. incan. 10.00 100-w. "
Ottawa	15 00	4	2·5	6	2·5	20	1 00	1·8	1·2	0·15	20	45.00 Arc.
Paris	21 00	4	3·5	7	3·5	10	1 00	2·5	1·7	0·2	10	11.00 100-c.p. incan.
Penetang	26 50	4	3	6	3	10	1 00	1·7	1·1	0·15	10	12.00 100-w. "
Peterborough	18 00	3	2·5	6	2·5	10	1 00	1·3	0·8	0·1	10 & 10	12 00 16&32-c.p.incan. 50.00 500-w. arc. 50.50 magnetic arc.
Petersburg and St. Agatha	Served by Baden.	4	6	12	6	10	1 00	5·1	3·4	0·4	10	
Port Arthur	22 25	4	2·5	6	2·5	10	1 00	2	1·3	0·15	10	5.00 60-w. incan. 8.30 00-w. "
Port Credit	28 00	4	4	8	4	10	1 00	3	2	0·25	10	11.00 "
Port Dalhousie	21 50	4	3	6	3	10	1 00	2·1	1·4	0·2	10	
Port Robinson	Served by Welland	4	3	6	3	10	1 00	1·8	1·2	0·15	10	
Port Stanley	42 70	4	4·5	9	4·5	10	1 00	5	3	0·4	10	16 00 "
Prescott	34 05	4	4	8	4	10	1 00	2·8	1·8	0·2	10	
Preston	21 00	4	4	8	4	20	1 00	2·3	1·6	0·2	20	11.00 60-w. incan 12.00 100-w. "
Rockwood	38 00	4	5·5	11	5·5	10	1 00	4·7	3·1	0·4	10	13.00 " "
Seaforth	40 00	4	4	8	4	10	1 00	4·3	2·9	0·4	10	15.00 " " 12.00 75-w. "

TABLE No. 1—Municipal Rates, 1914—*Concluded.*

Municipality.	Cost of power to municipality per h.p. per year.	Lighting Rates.				Power Rates.						Street Lighting.
		Domestic		Commercial		Prompt payment discount.	Per h.p. per month.	1st 50 hr. per month per kw-hr.	2nd 50 hr. per month per kw-hr.	All add'l per kw-hr.	Prompt payment discount.	
		Per 100 sq. ft.	Per kw-hr.	1st 30 hr. per kw-hr.	All add'l per kw-hr.							
	$ c.	c.	c.	c.	c.	%	$ c.	c.	c.	c.	%	$ c.
Sebringville	Served by Stratford	4	5	10	5	10	1 00	5·4	5·6	0·4	10	
St. Catharines	14 00	4	3	6c. 1st 30 hr. 3c. next 70 hr.	0·6	25	1 00	1·8	1·2	0·15	25	8.00 100-w. incan.
St. Mary's	29 50	4	5	10	5	10	1 00	3·6	2·4	0·3	10	13 00 100-w. incan. 25 00 250-w. nitrogen. 65.00 Arc.
St. Thomas	28 00	4	2·5	6	2·5	20	1 00	2·5	1·7	0·2	10	10 00 75-w. incan. 53.00 Arc.
Stayner	43 57	4	4·5	9	4·5	10	1 00	4·2	2·8	0·3	10	12.00 100-w. incan. 9.00 60-w. "
Stratford	30 00	4	4	8	4	20	1 00	3·6	2·4	0·3	10	
Sunderland	Note A.	3	6	12	6	10	1 00	4·5	3·0	0·4	10	
Thamesford	45 00	4	6	12	6	10	1 00	5·6	3·8	0·5	10	14 00 100-w. "
Thorndale	45 00	4	6	12	6	10	1 00	5·6	3·8	0·5	10	14.00 "
Tillsonburg	32 00	4	4	8	4	10	1 00	3·8	2·5	0·3	10	11.00 "
Toronto	15 00	4	3	8	3	10 to 20	1.35 1st 10 h.p 1.00 all add'l.	1·5	1	0·5	10to 20	9.00 "
Walkerville	38 00	3	4	8c. 1st 30 hr. 4c. next 70 hr.	0·8	10	1 00	3	2·4	0·3	10	10.50 60-w. incan.
Waterdown	26 00	4	5	10	5	10	1 00	3·5	2·4	0·3	10	10.00 100-w. " 8.75 100-w. mul. or 75 w. series incan. 10.00 100-w. ser. incan. 10.50 150-w. mult. "
Waterloo	22 50	4	4	8	4	25	1 00	2·5	1·7	0·2	25	25.00 3-lt. standard 1-100-w. & 2-60-w.

Welland	14 00	4	3	6	3	25	1 00	1·8	1·2	0·15	25	40.00 5 lt. standard 1-100-w. & 2-60-w. incan. 18.00 250-w. incan. 9.00 100-w. "
West Hamilton	Served by Dundas.	4	4	8	4	10	1 00	2·8	1·8	0 2	10	14.00 "
Weston	30 00	4	3	6	3	10	1 00	3	2	0·2	10	12.00 " 40.00 5-lt. st., 4-100-w. incan.
Winchester	43 77	4	4	8	4	10	1 00	3·1	2·0	0·25	10	15.00 100-w. incan.
Windsor	38 00	3	4	8c. 1st 30 hr. 4c. next 70 hr.	0·8	10	1 00	3·6	2·4	0·3	10	
Woodbridge	33 83	4	4·5	9	4·5	10	1 00	3·9	2·6	0·3	10	
Woodstock	23 00	4	3	6	3	20	1 00	2	1·5	0·2	10	25.00 250-w. incan. 10.00 60 or 100-w. incan.
Woodville	Note A.	3	6	12	6	10	1 00	4·5	3·0	0·3	10	

Note A.—Service commenced during October, 1914.

systems of supply and the amount and load factor of power consumed. The commission recommends the rates to be applied by the municipality for the consumers, and the municipalities, in general, adopt them. The rates for sale are now on a uniform basis and involve a service charge which, in case of power, consists of a flat rate of $1, a special rate of approximately twelve times the standard rate for the first fifty hours of service each month, and of approximately eight times the standard rate for the second fifty hours of service each month, the balance being at a standard rate per kilowatt hour. Domestic lighting rates bear a service charge of 3 or 4 cents per 100 square feet of floor area per month and a standard rate of from 2·5 to 7 cents per kilowatt hour. Commercial lighting rates in general have a service charge involving the first thirty hours per month and a standard rate for all additional time. Discounts for prompt payment apply throughout. The average rate paid for domestic service is calculated to be 3·7 cents per kilowatt hour. Street lighting rates are, in general, flat rates applied to the particular type of street lighting units used by each respective municipality.

Power is bought from the Ontario Power Company on a 20-minute peak basis, and taken by the municipalities in a similar manner. The oversale of power by the commission, resulting from the time distribution of the respective superimposed pay peaks is quite an appreciable amount, and is in excess of the line and transformer losses, etc., which has justified the commission in excluding loss costs from power rates; the flattening of the load curve, however, over the 24-hour period is gradually reducing the oversale.

The individual loads are typical commercial, domestic, and municipal loads, and do not include any electrochemical or electrometallurgical loads. The municipal nature of practically all the loads concerned has shown the possibilities of flattening the 24-hour load curve. Pumping to reservoirs is undertaken on off-peak hours, and is responsible to a great extent for the magnitude of night loads as shown, and again the pumping equipment usually includes synchronous motors which, when necessarily operating as day loads, have a power factor corrective value favourably comparative with their energy consumption. The load factor on the Niagara system is said to average about 80 per cent.

The Ontario Power Company at Niagara Falls, the source of power for the Niagara system, has an installed capacity of 160,000 horse-power in fourteen generator units and, in addition to the Hydro-Electric Commission of Ontario, has a very large market established in New York state, through the Niagara, Lockport, and Ontario Power Company, and a considerable market in Ontario adjacent to the generating plant.[1]

The Big Chute generating station owned by the Hydro-Electric Commission serves the Severn system.

Previous to the use of the commission's power, the industrial market for steam generating central electric stations was limited, as the rate for power from the water-power companies bore a recognizable relation to cost of power from isolated steam-power plants of corresponding capacities. The municipalities served by the commission represent the major portion of the industrial centres of the province, and amongst these considerable rivalry has existed as to their industrial growth.

The practice of granting of municipal bonuses of fixed taxation or water rates, debentures or bond guarantees, free sites, money grants, etc., greatly in vogue several years ago, is gradually disappearing and, aside from these inducements, the individuality of the community was chiefly based upon transportation facilities, labour economics, and cost of power. The elimination of cost of power as a selective factor by the application of comparatively similar rates over a wide area, and the discouragement of bonusing, has led to a more fruitful and substantial competition among the municipalities, the active improvement of all public services directly influencing the conditions of transportation and labour.

[1] See publications issued by the Ontario Power Company.

The powers of the commission are very wide, and extend far beyond the distribution of power. Rates throughout the province may be investigated and controlled on application of any municipality; existing systems and undeveloped sites may be bought or expropriated; systems, in part or complete, may be designed, financed, and constructed; rivers may be improved for storage purposes, and so forth. These are particularly mentioned as they have been included in the actual work of the commission to date. Further, by its administration conjointly with the Provincial Department of Lands, Forests, and Mines of all water-power matters under provincial jurisdiction, that is, excluding only such affairs as arise under the Dominion Government's rights on navigable streams, the interests of the municipalities are fully guarded.

The existing competitors, in such portions of the province as are not directly served by the commission's systems, either by influence of the commission or by respect for its powers, sells at quite comparable rates.

As examples of two conditions of development quite different in aspect to the Hydro-Electric Commission, but which also are well worth study, reference is made herein to the Shawenegan system in the province of Quebec, and to the developed and undeveloped sites on the Winnipeg river in the province of Manitoba. It is to be found that throughout the whole of Canada the loads of the power systems have increased rapidly. The consideration of such rates of increase as being applicable to the future creates a most striking condition, and the development to meet such demands can only be supplied by the most careful utilization of water-power sources.

The Shawenegan Water and Power Company at Shawenegan Falls, Quebec, has an interesting system for study as to industrial use of electric power. This plant is noted for several reasons: first, its magnitude; second, its extent of distribution; third, its creation of an industrial centre from the power standpoint alone; and fourth, its supplying of power for several electrochemical plants.

Shawenegan Falls is situated on the St. Maurice river about 20 miles north of the St. Lawrence river and about 80 miles east of Montreal. The St. Maurice river, on completion of the storage works now under construction,[1] will have a capacity of 204,000 horse-power at the minimum-flow period, which practically corresponds to the present capacity of the installed machinery at Shawenegan Falls. The water is used in the two electric generating stations of the company and, in addition, water is sold to the Northern Aluminium Company for use in their turbines, and to the Belgo-Canadian Pulp and Paper Company. The Northern Aluminium Company uses water to generate 33,000 horse-power for use in their reduction furnaces, the direct-current generators being installed connected to the hydraulic turbines, the water rates being on the basis of direct current output. In the Belgo-Canadian Pulp and Paper Company, 14,000 horse-power is delivered by turbines on the pulp grinders. In addition, the Canadian Carbide Company at Shawenegan Falls utilizes 12,000 horse-power, and a cotton factory, 550 horse-power, so that, besides a miscellaneous local load, industries have been created consuming nearly 60,000 horse-power at a site where but a few years ago no community existed and transportation was entirely absent.

The Shawenegan power plants are two in number, aggregating approximately 150,000 horse-power capacity. No. 2 plant[1] contains five units, each of 20,000 horse-power capacity.

The greatest load of the power transmittted is at the city of Montreal, which is served with four direct transmission circuits direct from Shawenegan Falls, this being but one source of the horse-power consumed in that city. A market for 6,000 horse-power has been built up at the city of Three Rivers on the St. Lawrence river, a location which affords excellent facilities for transcontinental railway service, and

[1] See "Canadian Hydraulic Power Development," Mechanical Section, International Engineering Congress, 1915.

[1] See *Electrical World*, vol. 59, p. 953.

lake and ocean transportation. The asbestos district in southern Quebec consumes several thousand horse-power, and the many municipalities in the various districts are also supplied.

The growth of power load and equipment of the Shawenegan Company affords an excellent example of the industrial growth of the country. Optimism as to the future of the industrial situation is indicated by the excess of generator capacity over the present load.

On the Winnipeg river, in Manitoba, two generating plants have been built to deliver power to the city of Winnipeg. The city itself has constructed a generating plant and transmission system having a present capacity of 51,500 horse-power at Point du Bois, 77 miles distant from Winnipeg, and the Winnipeg Street Railway Company has a plant of 28,000 horse-power capacity on the Pinawa channel, near Lac du Bonnet. These plants have developed a large market in what is at present a non-manufacturing city (for other than local needs) of 210,000 population.

On the Winnipeg river, within easy reach of three transcontinental railways, and at the gateway of the agricultural West, is a series of power sites which are now the subject of considerable study on the part of the Dominion Government as to the storage facilities and the economic possibilities in the development and market. Storage regulation is feasible to increase the minimum flow from 12,000 second-feet to 20,000 second-feet, which will result in several sites being well adapted for power purposes, the aggregate capacity of electrical power being 262,000 horse-power, in addition to 76,800 horse-power available at Point du Bois, and 28,200 horse-power at the Winnipeg Electric Railway Company's site.

Western Canada is the granary for a world-wide market, and the artificial replenishing of the notably fertile prairie soil is a problem for the future, to be solved only by abundant water supply. The communities, rapidly increasing in number and population, and the manufacturing now commencing for the local market will demand enormous quantities of power. The water-powers must be developed for this purpose.

DEPARTMENT OF THE INTERIOR, CANADA
DOMINION WATER POWER BRANCH

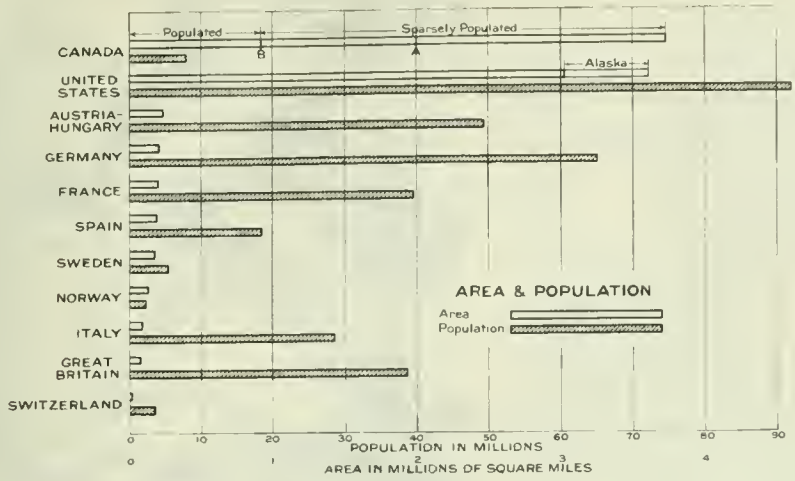
GRAPHICAL COMPARISON OF AREA, POPULATION, AVAILABLE AND DEVELOPED WATER-POWER IN CANADA, THE UNITED STATES AND CERTAIN EUROPEAN COUNTRIES

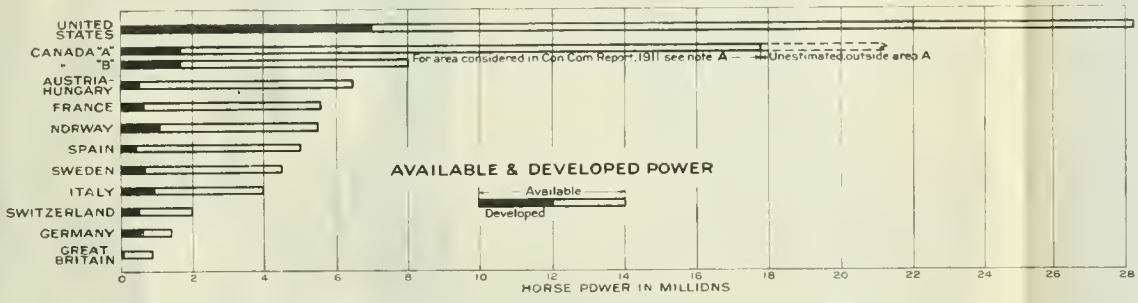
GENERAL NOTE

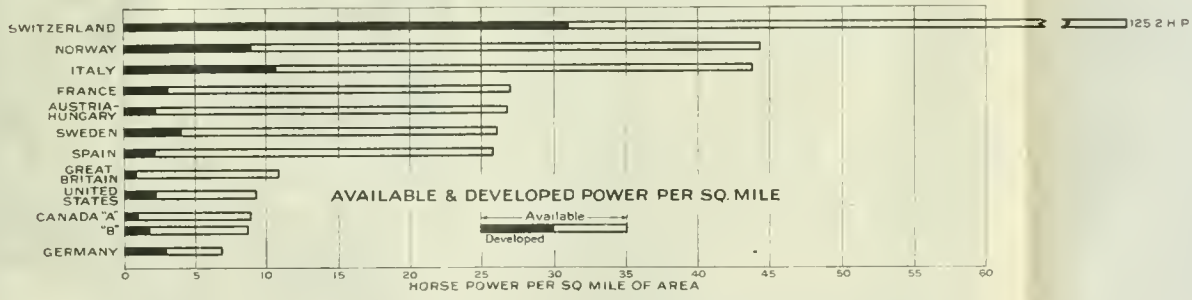
EUROPE Data concerning available and developed power in Europe taken from Mr. Surveyor's recent paper, read before the Canadian Society of Civil Engineers revised where possible from figures in U.S. Consular Reports current technical periodicals etc.

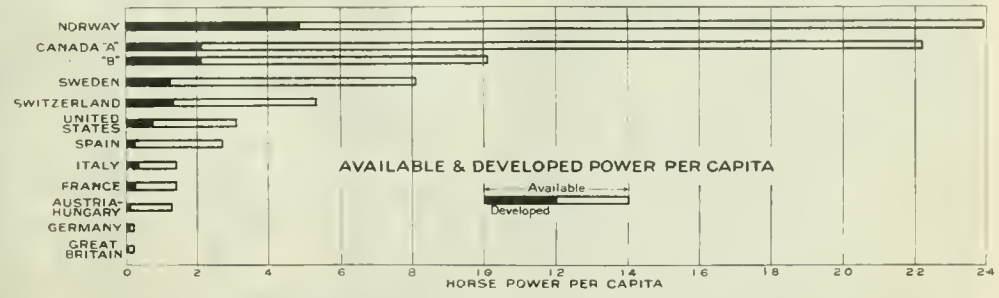
UNITED STATES Data from Evidence before Senate Committee on Water Power Bill December 1914.

CANADA Available power from Conservation Commission Report 1911. A refers to the area considered in Conservation Commission Report the remainder of the Dominion being so remote that no specific data is available. B refers to the populated area only.









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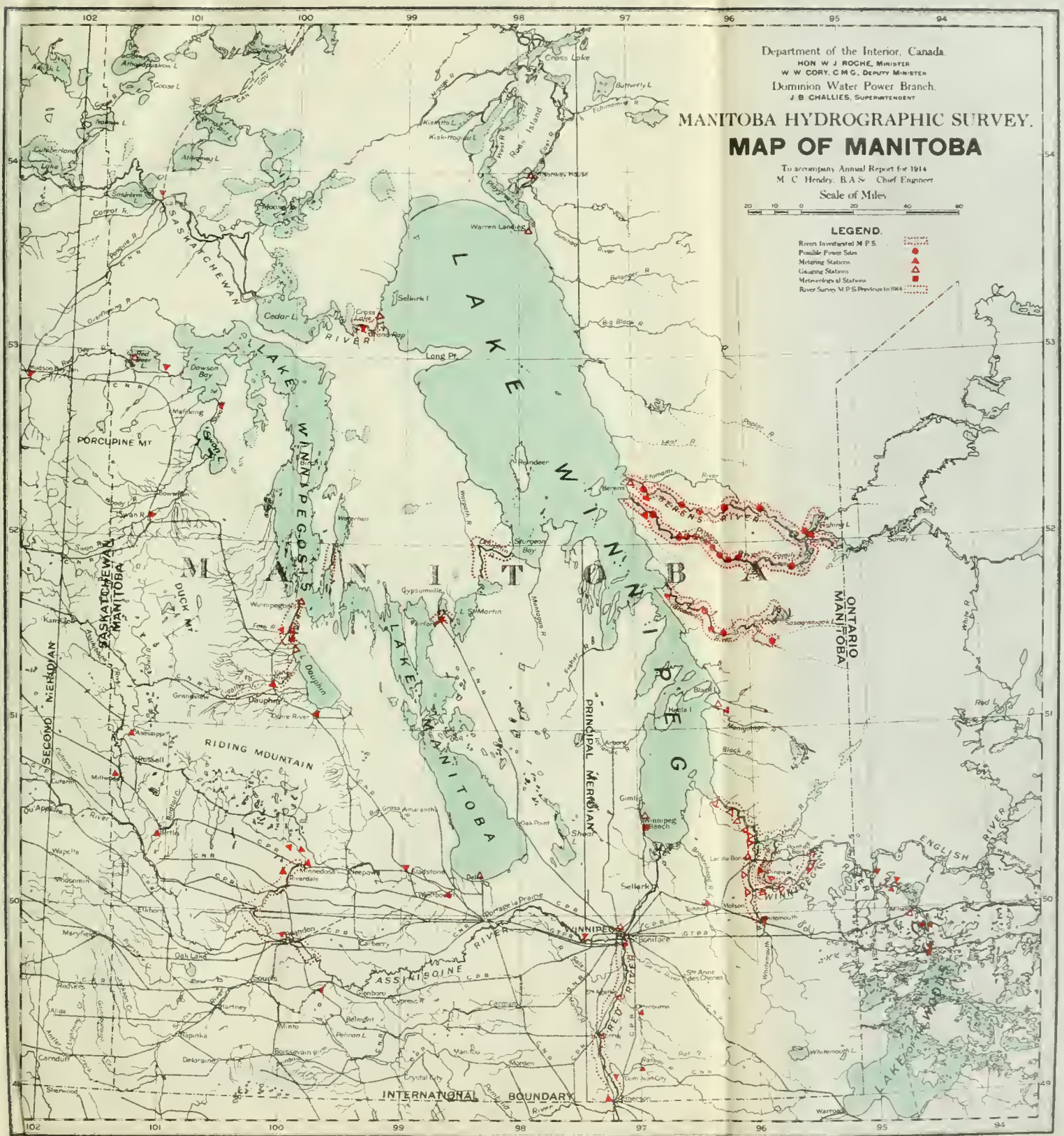

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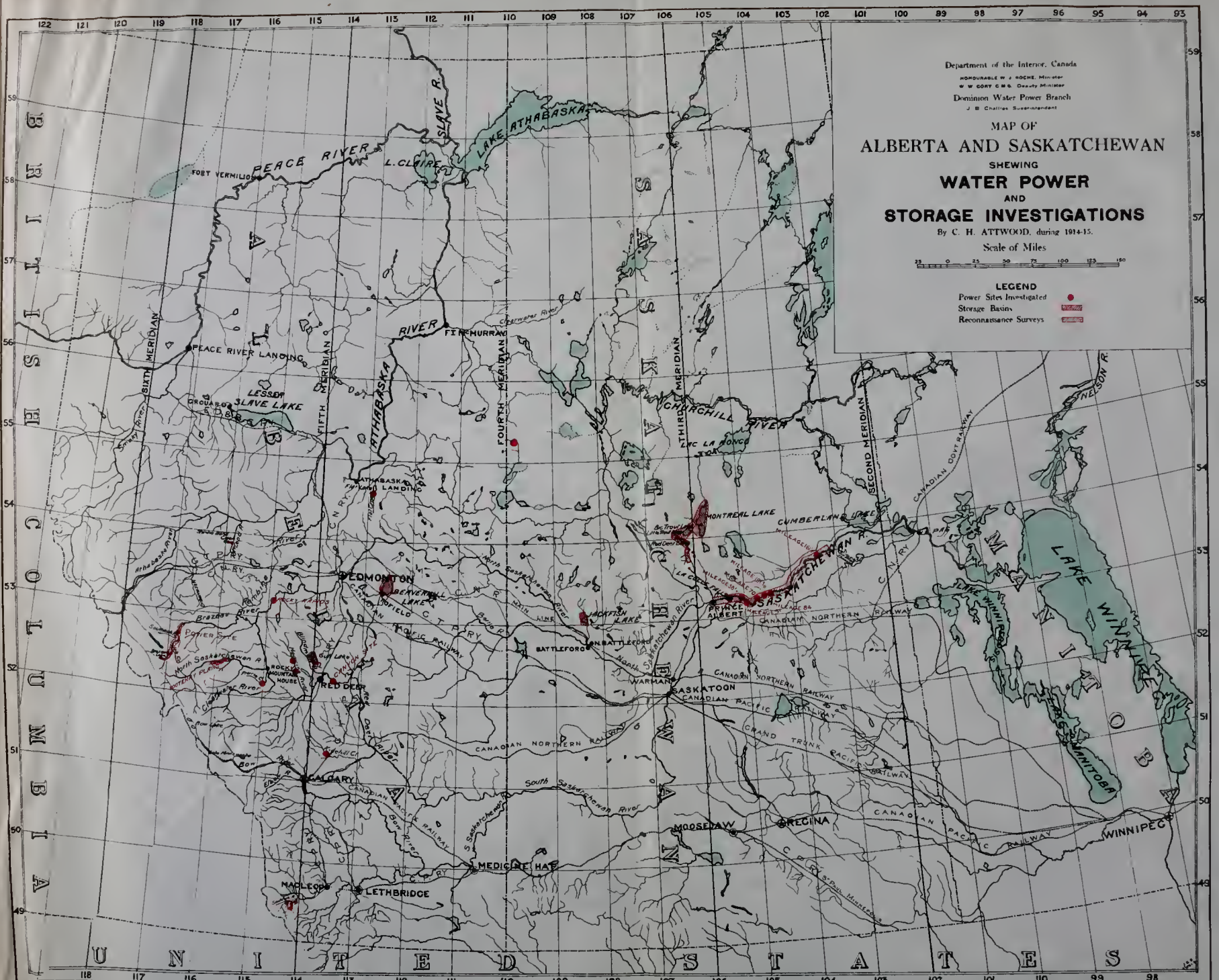
Department of the Interior, Canada
HONOURABLE W. J. ROCHE, Minister
W. W. CORY C.M.G. Deputy Minister
Dominion Water Power Branch
J. B. Challies Superintendent
MAP OF
ALBERTA AND SASKATCHEWAN
SHEWING
WATER POWER
AND
STORAGE INVESTIGATIONS
By C. H. ATTWOOD, during 1914-15.
Scale of Miles
LEGEND
Power Sites Investigated
Storage Basins
Reconnaissance Surveys
BRITISH COLUMBIA
ALBERTA
SASKATCHEWAN
MANITOBA
UNITED STATES
PEACE RIVER
L. CLAIRE
LAKE ATHABASKA
SLAVE R.
FORT VERMILION
PEACE RIVER LANDING
LESSER SLAVE LAKE
ATHABASKA LANDING
FIREBURRAN
Athabaska River
Clearwater River
Pembina River
Brazeau River
Battle River
Bow River
Red Deer River
Elbow River
Sheep Creek
Highwood River
Old Man River
Waterton River
Belly River
Milk River
North Saskatchewan River
South Saskatchewan River
CHURCHILL RIVER
LAC LA RONGE
MONTREAL LAKE
CUMBERLAND LAKE
LAKE WINNIPEGOSIS
LAKE WINNIPEG
LAKE MANITOBA
NELSON R.
SIXTH MERIDIAN
FIFTH MERIDIAN
FOURTH MERIDIAN
THIRD MERIDIAN
SECOND MERIDIAN
EDMONTON
BEAVERHILL LAKE
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PRINCE ALBERT
SASKATOON
WARMAN
ROCKY MOUNTAIN HOUSE
RED DEER
CALGARY
MEDICINE HAT
LETHBRIDGE
MACLEOD
MOOSEJAW
REGINA
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St. Paul Minneapolis

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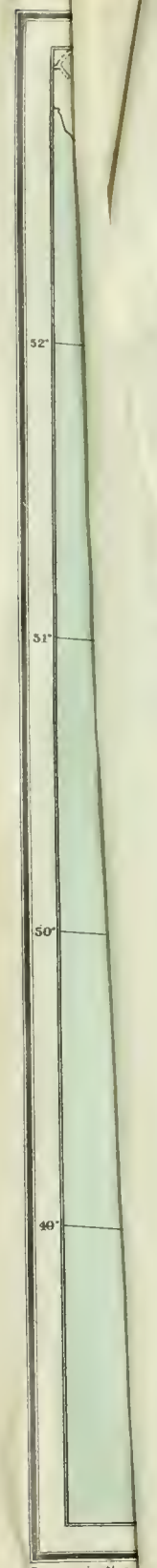

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DEPARTMENT OF THE INTERIOR

ANNUAL REPORT

OF THE

TOPOGRAPHICAL SURVEYS BRANCH

1914-15

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1916

No. 25b—1916.

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1. Map to illustrate progress of Dominion Land Surveys to March 31, 1915.

2. Sketch map and profile of base lines and meridian outlines in the district southwest of Port Nelson, and lying along Nelson river, to accompany the reports of B. W. Waugh, D.L.S., and G. H. Herriot, D.L.S.

3. Sketch map and profile of the 19th base line, ranges 1 to 5, east of the Principal meridian, to accompany the report of G. H. Herriot, D.L.S.

4. Sketch map and profile of base lines and meridian outlines in the district east of lake Winnipeg, extending from township 37 to township 50, in ranges 1 to 4, and from township 19 to township 22, in ranges 10 and 11, east of the Principal meridian, to accompany the report of A. M. Narraway, D.L.S.

5. Sketch map and profile of the 24th and 25th base lines, ranges 11 to 25, west of the Fourth meridian, to accompany the report of G. H. Blanchet, D.L.S.

6. Sketch map and profile of the 26th base line, between the Fourth and Fifth meridians, to accompany the report of F. V. Seibert, D.L.S.

7. Sketch map and profile of the 26th base line, ranges 1 to 17, and of the 27th base line, ranges 1 to 9, west of the Fifth meridian, to accompany the report of J. A. Fletcher, D.L.S.

8. Sketch map and profile of the 29th base line between the Fifth and Sixth meridians, to accompany the report of J. R. Akins, D.L.S.

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REPORT

OF THE

SURVEYOR GENERAL OF DOMINION LANDS

1914-15

DEPARTMENT OF THE INTERIOR,
TOPOGRAPHICAL SURVEYS BRANCH,
OTTAWA, August 9, 1915.

The Deputy Minister of the Interior.
Ottawa.

I have the honour to submit the following report of the Topographical Surveys Branch for the year ended March 31, 1915.

The progress during the past year and the general extent of the surveys at its close are illustrated by maps which accompany the report in monograph form.

In the parliamentary appropriations for the fiscal year 1914-15 provision was made for the continuance of Dominion land surveys on practically the same scale as for the previous year; the total appropriation for this purpose being $1,047,000.

BLOCK OUTLINES.

During 1913 the tide of settlement set in strongly towards Peace River district. Extending northerly from this, Peace and Athabaska rivers afford two natural highways for the progress of future settlement. This northerly country is to a large extent unknown and unexplored. Reports so far received indicate that it is mostly wooded, but that extensive swamps occur frequently, with here and there tracts of good agricultural land. Much of the land is unsuitable for settlement, but it is impossible to foresee where future settlement will take place. In order that the department may be in a position to proceed with subdivision surveys wherever required, the system of base lines and initial meridians has been extended into the unexplored districts. As these lines form the basis for all surveys which follow, they must be established with the greatest care and accuracy. Although the surveys are carried on remote from settlement, and practically no means of communication exist with civilization, the work is carried on with great precision. The surveyor is furnished with first-class equipment in instruments, and no surveys excepting those made in geodetic work are carried out with greater refinement. Good results are being obtained, and are largely due to the attention which the surveyors devote to the many smaller, yet not unimportant, details of the work. A party of twenty-three men in charge of a Dominion land surveyor is employed on each base line or meridian surveyed. In addition to the survey of the actual line the country for a distance of twelve miles on either side is explored; from the explorers' reports, maps are prepared which show the topography of the district, the kind and quality of the timber, and the nature of the soil. Simultaneously with the surveys of the block outlines, levels of the lines are taken; these form parts of a great network of levels which is being extended over the entire country.

Four parties were employed during the year on the survey of block outlines in northern Alberta. The 29th base line (between townships 112 and 113) was surveyed

from the Fifth to the Sixth meridian, a distance of 140 miles. This line passes about twenty-five miles north of Fort Vermilion, where it crosses the summit of Caribou mountains. These are lightly wooded with stunted spruce, and the surface is covered with deep moss, underneath which the ground remains frozen from year to year. Bears and caribou are plentiful, and fish abound in several small lakes. The surrounding country is gently rolling and covered with small spruce and poplar. The soil is good and grass plentiful.

The 26th base line (between townships 100 and 101) was established easterly from Peace river to the Fifth meridian, and the 27th was continued easterly from range 8 to the meridian. When cleared, most of this district will make splendid farming land, but at present it is covered with windfall and brulé. The land being generally level, extensive drainage will be necessary to drain the swamps and make the country accessible. A third party projected the survey of the 26th base (between townships 100 and 101) from the Fourth to the Fifth meridian, approximately 150 miles. This line is situated about forty miles north of McMurray, and crosses Birch mountains about fifteen miles west of Athabaska river. Between the river and the mountains the soil is good, and in places the timber is excellent. West of the mountains a surface of moss covers a mass of boulders embedded in clay.

The survey of the 24th base (between townships 92 and 93) and the 25th base (between townships 96 and 97) were continued westerly from Athabaska river to the Fifth meridian. A large portion of the district west of Athabaska river is occupied by Birch mountains, an extensive elevated plateau covered with boulders. The surface has been burned over and is now covered with windfall and scrub. Several extensive muskegs were met with. Legend lake, about nine miles long and three miles wide, contains an abundant supply of fish. It is so named because of a superstition held by the Indians that the lake is the abode of monsters.

To prepare for settlement along the line of the Hudson Bay railway, which, to a limited extent, is expected to follow the construction of this line, three parties were occupied in pushing forward the system of block outline surveys in northern Manitoba.

The Principal meridian was continued northerly from township 80 to township 88 through a formerly unknown country. The surface, though gently rolling, is a series of muskegs, mossy sloughs, and floating bogs, covered with windfall and second-growth spruce and tamarack. Drainage, which must precede settlement, is comparatively easy owing to the numerous creeks and rivers.

The same party retraced the Second meridian from township 56 to township 85. This retracement was necessary to determine the correct bearings and chainages for the line, as many of the records of the original survey had been destroyed by a fire in the survey camp shortly before the close of field operations.

The two remaining parties surveyed short portions of base lines and meridians in the vicinity of the right of way from Split lake northeasterly to Port Nelson. This district is mostly level with intersecting ridges, the surface being largely muskeg or tamarack swamps drained in part by Nelson river. The soil is a deep clay loam overlaid with moss; it will not be suitable for agriculture until the moss has been removed. The timber, which is sparse, consists mostly of burned spruce and bluffs of green poplar. Port Nelson is the proposed terminus of the Hudson Bay railway. At the time of the survey, five hundred men were employed on the construction of the harbour there.

To prepare for this subdivision in the near future, of the lands adjacent to the easterly shore of lake Winnipeg, a party was sent to establish short portions of the base lines in that vicinity. About one hundred miles of line were surveyed. Forest fires were prevalent and destroyed large areas of timber. The land near the lake is generally level, the surface being a succession of swamps, muskegs, and low rock

ridges. The muskegs are not deep, and the bottom is generally clay with more or less muck, but owing to the difficulty of drainage it is doubtful if this district will be settled in the near future. Silver and black foxes are plentiful.

TOWNSHIP SUBDIVISION.

As township subdivision is well in advance of settlement, surveys of this nature were considerably curtailed during 1914. Eighteen parties only were employed on subdivision at contract rates, whereas twenty-seven parties were employed on similar surveys the previous year. Eleven of the parties worked in the Peace River district west of Lesser Slave lake, where settlement was proceeding rapidly. In all the townships subdivided the soil is good and well suited for agriculture.

A few townships were subdivided by a party under contract around Wabiskaw lake, where several settlers had already located. This district will rapidly fill up when railway facilities are provided.

Subdivision of the lands adjacent to Athabaska river was continued, and these lands are now open for settlement as far north as township 94 or about thirty miles north of McMurray.

A few townships were surveyed in Manitoba to open up the lands ahead of settlement north of lake St. Martin and in the vicinity of Washow bay. One party was employed at each place.

Subdivision surveys being well ahead of settlement in Saskatchewan, no contract surveys were allotted in that province.

In addition to the eighteen parties employed under contract, fourteen parties were employed under daily pay for subdivision surveys which were of such a nature that they could not conveniently be executed under contract at the regular rates fixed by Order in Council. The principal surveys of this nature made during the year were at or near the following places: Fort Vermilion, in northern Alberta; Fort St. John and Hudson Hope, in the Peace River block; Peace River Crossing; Rocky Mountain House; Atikamek lake, north of Lesser Slave lake; along the Hudson Bay railway, and in the Railway Belt, British Columbia.

Surveys along the Hudson Bay railway now extend as far north as township 70, range 5, west of the Principal meridian.

Most of the surveys in the Railway Belt were undertaken at the request of the Dominion Lands agents. In addition to regular township subdivision, the survey parties in British Columbia make all necessary surveys of mineral claims and town and village sites; they also retrace the boundaries of previously surveyed Indian reserves and provincial lots. In districts where the land is most valuable the department disposes of it in parcels of forty acres or less. As the regular township subdivision in these cases is not sufficient to enable the owners to determine the boundaries of their holdings, an effort is made to survey two or more boundaries of each parcel and to mark at least two corners on the ground.

I regret to report that while engaged on surveys along the bank of Nahatlatch river, Mr. A. E. Hunter, D.L.S., lost his balance on a high precipice overlooking the river, and was drowned. His body was recovered several days after and brought to his home in Wiarton, Ontario, for interment.

Subdivision surveys of Dominion lands at the present time are much more elaborate than formerly: consequently the rates per mile for surveys under contract are considerably higher. To ascertain how subdivision surveys executed by parties under daily pay compare as to cost with similar surveys under contract, a party under daily pay was employed during the season on subdivision surveys under conditions as near as possible to those under which contract work is carried on. The place selected was a block of townships near Athabaska river, about thirty-five miles northeast of Athabaska. Although the surveyor lost part of his equipment by a canoe accident, and in spite of the fact that considerable time was spent in building roads, the cost per mile of his surveys was below the average cost per mile of surveys in the same district made at contract rates.

It is the intention to introduce a number of improvements in our methods of survey. All section lines in a township will now be surveyed and a few lines of levels run in each township. The survey of all the section lines will enable the settlers in the more or less wooded districts to find their lines with little difficulty, while the levels will be valuable later in the preparation of drainage schemes, highways and for other purposes.

INSPECTION OF SURVEYS.

The surveys executed under contract have been carefully inspected to determine if the work had been accurately performed and if the charges for doing the work were in accordance with the terms of the contract. Five inspectors were employed for this purpose, and their reports show that the contractors have done their work carefully and in conformity with the requirements.

When inspectors are not engaged on inspection work they occupy their time as far as possible in the performance of subdivision and miscellaneous surveys. During last season one inspector visited the camps of several surveyors in charge of parties under daily pay. He examined their instrumental equipment and their outfits and reported thereon to the office, as well as on the work performed and the general fitness of the surveyor to have charge of survey parties.

INTERPROVINCIAL BOUNDARY SURVEYS.

The delimitation of the boundary between the provinces of Alberta and British Columbia, begun in 1913, was continued last season under the same three commissioners as formerly. Two parties were employed on the survey, one under each of the commissioners appointed by the provinces: one party surveyed the boundary line and erected the boundary monuments; the other made a photo-topographical survey of the country on both sides of the boundary. The representative of the Dominion visited the parties occasionally to keep in touch with the progress of the work and to confer with the other commissioners on questions where difficulties or disputes might arise.

The boundary was established across Crowsnest and North Kootenay passes, and fifty-nine boundary monuments erected. Preliminary survey was commenced at South Kootenay pass.

LEVELS.

During the year four thousand five hundred miles of lines of levels were run, making the total mileage of levels up to the present time, nine thousand eight hundred. A publication is now in the hands of the printers giving in tabulated form the information collected by our surveyors for 7,400 miles of the levels already taken. It is expected that this publication will fill a long felt want, as it will contain much information that will prove invaluable in the development of new areas, in the reclamation of swamp lands, in the extension of railway systems, in the development of water areas and in many other public aud private undertakings.

TOPOGRAPHICAL SURVEYS.

The topographical survey of the portion of Jasper park in the vicinity of Jasper, begun in 1913, was continued. The flats of Athabaska and Miette rivers, and the rolling country behind the flats were surveyed for a distance of approximately five miles on each side of the town. The survey was made by means of the plane table, and from the information collected it will be possible to prepare a contour map of the district with intervals of ten or twenty feet. The map will be most useful in planning improvements and public works for the development of the park. The attractiveness of the place is greatly enhanced by the numerous small lakes scattered over the area surveyed.

The topographical survey of Crowsnest forest reserve made at the request of the Forestry Branch was completed, and the publication of the map of the reserve is now being proceeded with. An area of approximately seven hundred square miles was surveyed, comprising the eastern slope of the Rocky mountains southerly from the Canadian Pacific railway to the international boundary. Large deposits of coal occur within the reserve, but only those near the railway are being worked as yet. An oil-well, bored to a depth of 970 feet, yields from fifteen to eighteen barrels of crude oil a day.

Topographical surveys were considerably retarded by high winds and smoke from forest fires. During a season comprising one hundred and twenty-five days, forty-six days were totally unfit for work, while several others were unfavourable to good results.

STADIA SURVEYS.

Twelve parties were employed on stadia surveys of water areas in the portions of Saskatchewan and Alberta, which were subdivided many years ago. At the time of the original surveys many bodies of water existed which have now partially or entirely dried up leaving considerably more land available for settlers. In some instances bodies of water are found which did not exist, or were not noticed by the surveyor when subdividing the townships: in other instances the courses of rivers are found to have greatly altered. Each township is carefully examined by a stadia party, and with the information collected we are able to issue new township plans representing conditions as they are at present. During the year, 605 townships were examined, and 2,733 miles of traverse made by the stadia parties alone.

CORRECTIONS AND RESURVEYS.

In making the subdivision of Dominion lands, wooden posts have been employed to a very large extent. Previous to 1883, iron posts were used to mark township corners only, while from 1883 to 1889 they were also used to mark section corners in prairie, while wooden posts were used in bush. From 1890 to the present all township and section corners have been marked by iron posts. Quarter-section corners were first marked by iron posts about 1908. From this it is evident that up to six or seven years ago wooden posts were very extensively used as monuments.

Although sound wooden posts were invariably chosen, their existence as monuments was of very short duration. They decayed rapidly and were often broken. Again, iron posts are frequently removed by persons, who perhaps do not understand the purpose they serve, or by others who are interested in destroying evidence of the survey. In making improvements, homesteaders often plough over monuments, thus destroying them. The destruction of monuments is an indictable offence punishable by imprisonment. Although a reward of fifty dollars has been offered for evidence of offences, very few convictions have been secured, and the removal of posts and destruction of monuments continue. A form of iron post, which will be much more difficult to remove, is being made at present.

When the survey monuments have disappeared to any considerable extent, new settlers experience much difficulty in determining the limits of their homesteads. Resurvey under the provisions of clause 58 of the Dominion Land Surveys Act are undertaken in townships now being colonized, when investigation shows that such a survey is necessary to determine the boundaries of the various quarter-sections. In townships where a large portion of the land is patented and has passed under provincial jurisdiction, resurveys are not undertaken, as the perpetuation of the monuments, in such cases, is the duty of the owners of the lands.

Surveys of twenty or thirty years ago were not made with the same care and precision as is practised to-day. On examination of those surveys, it is often found that the bearings and chainages are very erroneous,, and the area of quarter-sections is

considerably larger, or smaller, than returned by the surveyor. Owing to these irregularities of survey, it often happens that adjoining homesteads differ in area by as much as fifty or sixty acres, which gives rise to much dissatisfaction among the settlers, and litigation often results. Errors in the survey of settled lands can be corrected only under the authority of section 57 of the Dominion Lands Surveys Act.

The Department of Justice has recently ruled that sections 57 and 58 of this Act are not applicable to lands which passed from the control of the Dominion prior to the date the Act was assented to, viz.: March 17, 1908, unless authorized by the Legislature of the province in which the lands are situated. Acts authorizing these surveys have been passed by the provinces of Alberta and Saskatchewan, but up to the present Manitoba has not done so.

Three parties were employed on the resurvey of townships under the provisions of section 58 of the Dominion Lands Surveys Act. Fourteen townships were either wholly or partly resurveyed. These parties also made surveys of a miscellaneous nature, such as extending subdivision lines over the dried-up beds of lakes, which originally covered large areas. They established monuments to mark various corners made accessible by the partial drying up of lakes.

One surveyor with an assistant only, was employed throughout the season in travelling over the country attending to complaints, correcting errors, erecting monuments and making various adjustments which did not involve much work. Towards the close of the season, when their other surveys had been completed, two other surveyors, each with an assistant, were employed at similar miscellaneous work.

The surveys of base lines and meridians made many years ago, when instruments and methods were not sufficiently accurate, are often found to be quite erroneous. Errors as great as twenty-seven chains in distance and seventeen chains in direction have been discovered. In order to determine the exact location of the monuments existing along such lines, a retracement survey is necessary. This work was commenced in the season of 1912, and has been continued during each successive season.

In 1914, one party was employed on the retracement of the second base line (between townships 4 and 5) between the Second and Fourth meridians, and of the Fourth meridian from the international boundary to township 54. This party retraced over 700 miles.

The council of the city of Prince Albert asked for a resurvey of the river lots in Prince Albert settlement. Where most of the lands affected are private property, the usual answer to requests for resurveys in cases of this kind is that the Dominion Government has no interest in the lands and any resurvey that may be required must be made by the province under the authority of the provincial laws.

The case in question, however, was very exceptional. The survey was made a long time ago and the records were imperfect; there seemed to be justification for the departure from the general rule. The difficulties cited by the city council seemed to be due mostly to the disappearance of the marks of the original survey and to imperfections in the plan of the same. It was considered that the proposed resurvey would remove the difficulties.

Accordingly, one party made a retracement survey of part of the settlement and the surrounding townships. They also resurveyed a township under the provisions of section 58 of the Dominion Lands Survey Act, and subdivided a portion of Sturgeon Lake Indian reserve No. 101, which had been surrendered to this department.

LATITUDE OBSERVATIONS.

One party, consisting of a surveyor and one man, observed for latitude on the Fourth meridian near lake Athabaska, at the intersections of Peace river with the Fifth and Sixth meridians, and also on the Sixth meridian near the 23rd base line. For this work the surveyor was supplied with special instrumental equipment including zenith telescope.

SETTLEMENT AND TOWNSITE SURVEYS.

In 1908, the townsite of Churchill was surveyed and the general scheme for the town plot was laid out. The boundaries of the streets and blocks were established but time did not permit the surveyor to subdivide the blocks into lots that season and to post them properly.

A portion of the townsite having been disposed of, it was necessary to complete the work which had been left unfinished.

The trip from Pas to Churchill required from March 11 to April 13. From Pas the party travelled on the Canadian Northern railway to the end of steel, a distance of about 85 miles, and proceeded along the right-of-way, a distance of 155 miles. During this portion of the trip, horses were used, but from that point five teams of five dogs each were used as a means of transport. From ten to thirty miles were travelled each day, depending on the character of the country and the depth of the snow. High winds delayed progress considerably, and Port Nelson was reached about April 1. From there the party went directly across country to Churchill, the usual custom being to follow the coast line. During this part of the trip, they suffered considerably from frost bites as there was a scarcity of wood for fuel.

The return journey was commenced on August 25, and a few days were spent at Port Nelson attending to matters regarding transportation. The party left that point on September 5, and reached North Sydney, Cape Breton, on September 14.

The townsite is situated on a rock and gravel bed. The country around Churchill is quite barren, but there is considerable spruce and tamarack near Churchill river. Grass grows near the edges of the rivers and lakes. The summer season is very short, commencing August 1, and lasting about six weeks. The spring is cold and wet, snow storms occurring during June.

One party was engaged in surveying settlements along Mackenzie river at Forts Providence, Wrigley, Simpson, Norman and Good Hope, at Hay river and Fort Resolution, which are situated near Great Slave lake, and at Pelican settlement on Athabaska river. Most of the inhabitants of these places are Indians and half-breeds, whose chief occupation is hunting. The party engaged at this work remained in the field from the spring of 1913 to the fall of 1914.

Winter sets in early in the northern country, and Mackenzie river was completely frozen over on November 18. When the ice is forming, drift-ice piles up in huge masses wherever the current is swift, and then becomes frozen solid. This forms an extremely rough surface for dog teams to travel upon. The surveyor had to cut several miles of trail through the ice, often necessitating the making of a road through walls of ice, eight feet high and four feet thick. During the months of January and February, the temperature varied from 30° to 60° below zero, and no surveying was done. During this time the surveyor and assistant were employed at the preparation of returns, while the men secured wood for fuel, which was scarce and had to be brought a considerable distance.

During the summer the climate throughout the north is ideal, and is not liable to sudden changes. The weather is very warm in July and August, but there is sufficient rainfall to keep the ground in excellent condition for the growth of grain and vegetables. The wet season extends from the latter part of August to the middle of September, when frosts occur frequently, and snow falls occasionally at the end of August.

Moose, caribou, and bear are quite plentiful, while mountain sheep and goats roam over the mountain slopes. During the summer season, ducks, geese, ptarmigan, and partridges can be obtained with but little difficulty Fish in abundance may be had in all bodies of water of any considerable size. Splendid whitefish, trout, pike and many other varieties are very plentiful in Mackenzie river and in Great Bear and Great Slave lakes.

At all the points visited, all vegetables, excepting tomatoes and melons, are successfully grown. They attain good size and are of splendid quality. Even at Fort Good Hope, on the verge of the Arctic Circle, splendid gardens were seen. Raspberries, cranberries and blueberries grow in abundance throughout the north. Farming is carried on to a small extent at Forts Resolution, Simpson, and Hay River, where wheat and oats have been successfully raised. Barley and oats are grown at Fort Providence, and barley at Fort Norman. A well-equipped saw-mill is located at Fort Resolution, and another at Fort Simpson. These furnish shingles and lumber for the inhabitants. The R.N.W.M. Police have detachments stationed at Forts Resolution and Simpson. Besides preserving order, they assist the fire patrols, and forest fires are now decreasing in number. A large mission school, where Indian and half-breed children are educated, is conducted at Fort Providence. Copper deposits exist in the vicinity of Forts Resolution and Good Hope, and galena has been found near Fort Resolution.

At the request of the Dominion Parks Branch, many surveys of a miscellaneous nature were made in the Yoho and Rocky Mountains parks. One party was engaged on this work throughout the season, and another for a few months. Various road location surveys were made, and levels taken in the vicinity of Banff, Field, and Lake Louise. The Calgary-Banff automobile road was traversed, and levels taken for a distance of twenty-two miles. Cemeteries were laid out at Bankhead and Field; Canmore townsite was re-surveyed. Surveys of the villa-lot section and the townsite at Banff, commenced last season, were also continued. This work was made to conform with designs submitted by Mr. Mawson, town-planning expert.

TIMBER BERTHS.

Under the present regulations, timber berths are surveyed by the department before they are offered for sale. The cost of the survey in each case is included in the upset price of the berth. During the season, three berths were surveyed, according to instructions issued from this office, necessitating the establishment of approximately twenty-three miles of timber-berth boundaries. Two of these berths were surveyed by surveyors employed under daily pay. Tenders were received for the survey of the third, and the work was allotted to the surveyor submitting the lowest tender.

MINERAL CLAIMS.

Every mineral claim is designated by a lot number in the group to which such lot belongs. The claimant, after staking his claim, is required to apply to the Surveyor General to have instructions issued to a Dominion land surveyor to have the boundaries of the claim run out, measured, and marked on the ground. Lot and group numbers for the claim are furnished with the instructions. After completing the work on the ground, the surveyor must forward to the Surveyor General a plan of the claim on traeing linen, together with complete field notes. He must furnish, as well, the necessary duplicates, the plans for filing with the mining recorder and for posting on the claim.

During the past season, surveys were made of sixty-seven mineral claims, nine being located in the Yukon territory. Returns were also received for eight mineral claims surveyed in 1912, and for thirty-six surveyed in 1913. All of these were located in the Yukon territory, and the survey returns were not completed in time for previous reports.

YUKON SURVEYS.

Dominion land surveys in the Yukon territory are under the direction of a Director of Surveys who has his office at Dawson; he has a staff of two draughtsmen. During the year, 113 miles of base lines and traverses were surveyed. The work was mostly in connection with mining claims.

STATEMENT OF MILEAGE SURVEYED.

The following is a comparison of the mileage surveyed each year since 1912:—

Nature of Survey.	April 1, 1912, to March 31, 1913.	April 1, 1913, to March 31, 1914.	April 1, 1914, to March 31, 1915.
	Miles.	Miles.	Miles.
Township outlines	2,718	3,760	3,270
Section lines	10,365	7,918	7,100
Traverse	3,505	5,748	5,141
Resurvey	2,586	1,632	2,610
Total for season	19,178	19,058	18,055
Number of parties	72	66	59
Average miles per party	266	289	307

The following tables show the mileage surveyed by the parties under daily pay, and by the parties under contract:—

WORK OF PARTIES UNDER DAILY PAY.

Nature of Survey.	April 1, 1912, to March 31, 1913.	April 1, 1913, to March 31, 1914.	April 1, 1914, to March 31, 1915.
	Miles.	Miles.	Miles.
Township outlines	1,619	2,074	2,088
Section lines	1,358	1,695	1,756
Traverse	992	4,179	3,987
Resurvey	2,538	1,613	2,538
Total for season	6,507	9,561	10,369
Number of parties	35	39	41
Average miles per party	186	245	255

WORK OF PARTIES UNDER CONTRACT.

Nature of Survey.	April 1, 1912, to March 31, 1913.	April 1, 1913, to March 31, 1914.	April 1, 1914, to March 31, 1915.
	Miles.	Miles.	Miles.
Township outlines	1,099	1,695	1,514
Section lines	9,077	6,214	5,012
Traverse	2,517	1,569	1,154
Resurvey	48	19	6
Total for season	12,671	9,497	7,686
Number of parties	37	27	18
Average miles per party	342	352	427

Owing to the nature of their work, twelve parties are not included in the statement of mileage for the year ended March 31, 1915.

COST OF SURVEYS.

The following statement shows the average cost per mile of surveys executed by surveyors under daily pay, and by surveyors under contract:—

	Surveyed under daily pay.	Survey under contract.
Total mileage surveyed	10,369	7,686
Total cost	$504,950 00	$229,303 00
Average cost per mile	48 70	$29 83

CORRESPONDENCE.

The correspondence consisted of: letters received, 14,067; letters sent, 17,502.

ACCOUNTS.

Number of accounts dealt with, 1,710; amount of accounts, $1,046,910; number of cheques forwarded, 3,450.

OFFICE WORK.

(T. Shanks, Assistant Surveyor General.)

For some years the organization of an efficient office staff has been seriously interfered with owing to the frequent changes in the personnel of our technical officers. It was felt that this was largely due to the activity in general surveying and engineering work, which provided employment with better remuneration and brighter prospects for men who were qualified by special training in technical schools or by experience in practical work. When conditions changed in the business world, it was expected that the office staff would tend to become more permanent in nature. This

may be the result eventually, but up to the present the improvement has not been noticeable. During the past year fourteen clerks have severed their connection with our office. Three left to resume their studies at the university, four preferred field work to office work, one accepted a more attractive position elsewhere, and six were transferred to other branches or departments of the service. Fourteen men were selected by the Civil Service Commission to replace them but, while possessing the necessary educational qualifications, the new men lack the training and experience of the clerks who have gone.

To add to the difficulties caused by the unsettled condition of the staff, the office has suffered the temporary loss of twelve clerks who have enlisted for active service in the European war. Nine of these went with the first contingent and three with expeditionary forces that were recruited later. Additional recruiting will undoubtedly lead to the temporary loss of others willing to respond to the call of duty.

There has been no relaxation in the prosecution of our field work during the past year. For some time, when the flood of immigration was at its highest, there was some difficulty in carrying on field operations so as to keep ahead of the rapid development in western Canada. A sufficient number of properly qualified surveyors could not be obtained as the remuneration offered in other branches of engineering was more attractive. At present, with the exception of a few localities, the surveyors are well ahead of settlement and it is no longer difficult to obtain efficient technical assistance in carrying out our field work.

The completion of township subdivision in those districts where it had been urgently required owing to the demands of settlement, enabled the department to devote some attention to several branches of the field work which had been neglected owing to the pressure of other work. Among the divisions of the work now receiving greater attention are resurveys, stadia surveys of water areas, the securing of magnetic and astronomical data, and the taking of levels.

The resurveys are chiefly for the purpose of re-establishing corners where the original monuments have disappeared and for the correction of errors in the old surveys. These resurveys increase in difficulty with the advance in settlement. The aim of the department is to assist the homesteaders to find their true corners, but in some cases the owners of adjoining lands object to the resurvey and an awkward situation results. In other cases municipal or private improvements may have been made which would be affected by the re-establishment of the corners in correct position.

Stadia surveys of water areas have been rendered necessary by the great changes in these topographical features since the original surveys were made. In many cases areas shown on the old maps as lakes are now being subdivided into homesteads. In other cases the opposite change has taken place, and lakes which have all the appearance of being permanent are in existence over areas which were once shown as dry land. Frequently an additional reason exists for these surveys owing to the unsatisfactory nature of the water boundaries for the purpose of accurately defining the land to be granted. This difficulty does not arise where the bank is a permanent feature, but where it is subject to change it has been found advisable to substitute straight lines whose positions can be definitely located.

The work of levelling and the collection of magnetic and astronomical data can be done by our field parties at very little extra expense while carrying on the ordinary land surveys, and afford a means of securing much information of great value both from a practical and a purely scientific standpoint.

The change in the general nature of the field work and the wider scope of the investigations carried out by our survey parties have resulted in a corresponding change in the character and amount of the office work. In the earlier days of the branch the surveyors were employed principally in the subdivision of townships into sections. The office work in preparing instructions and examining survey returns was comparatively simple. The varied nature of the present surveys and the complicated

problems to which they give rise have created a greater need for a competent and permanent staff familiar with all the intricacies of our work.

The miscellaneous or routine business of the office continues to increase. This covers such points as inquiries about the nature and capabilities of the districts surveyed, information as to the character and extent of the surveys made or proposed, correspondence and action in connection with petitions for the re-establishment of lost corners, the renewal of monuments in poor condition, the correction of actual or supposed errors in survey lines, and the furnishing of information about areas, corner monuments, etc.

Details of work in the different divisions are given in the reports below by the several chiefs, and the usual schedule of work executed during the twelve months is added in Appendix No. 4.

DIVISION OF SURVEY INSTRUCTIONS AND GENERAL INFORMATION.

(H. G. Barber, Chief of Division.)

The work of the division consists, in general, of the preparation of instructions for the surveyors who are engaged in the field operations, the entering of all survey returns in the various registers, the issuing of all preliminary plans except for the townships in the Railway Belt of British Columbia, the answering of requests for information received from the general public and from other branches and departments and the issuing of the annual report of the branch.

During the twelve months just ended the total number of draft letters and memoranda was 9,592, an increase of more than fifteen per cent over the preceding year.

Two hundred and fifty-seven drafts of instructions were issued to surveyors for the execution of various surveys; this involved the preparation of 3,410 sketches and 103 maps and tracings.

Two thousand two hundred and nineteen communications from settlers and others and inquiries from other branches and departments were dealt with. This necessitated the preparation of 455 sketches, 179 maps and plans and the copying of 345 pages of field notes. Two thousand and ninety-five sketches were also copied for the information of other branches.

Thirty descriptions of parcels of land were drafted and a number checked and revised for other branches.

Preliminary plans were issued for 275 townships. These plans allow of the land being opened for entry at once without waiting for the final examination of the surveyor's returns and the issue of the official plans. Four copies of each plan are required. Up to the present time this division has prepared these plans for all townships in Manitoba, Saskatchewan and Alberta, those for the townships in the Railway Belt of British Columbia having been made by the British Columbia Division of the branch. It has recently been decided that in future all preliminary plans are to be issued by this division. As six copies are required of each of the British Columbia plans, this will mean a considerable increase in the work of the division.

Plans of 948 townships and of thirteen townsites or settlements were received from the lithographic office, entered in the various registers and forwarded to the Survey Records Branch. Seventy-three sectional maps and 105 miscellaneous plans were also received and distributed.

During the year there were received from the surveyors in the field and entered in the office registers: 1,600 progress sketches, 382 books of field notes for townships surveys, 440 books and 1,111 plans for miscellaneous surveys, 251 timber reports, 229 statutory declarations, sixty books of azimuth observations in connection with the survey of block outlines and returns for magnetic observations and for seven timber berths. General reports were received from all the surveyors under daily pay.

Their examination having been completed, 574 field books of township surveys and 206 books and 180 plans of miscellaneous surveys were placed on record.

For reference in the work of the office there were received from the Survey Records Branch 5,657 field books and 1,046 plans and from the Registration Branch 1,968 files.

The preparation of the third edition of the pamphlet entitled "Description of the surveyed townships in the Peace River district in the provinces of Alberta and British Columbia" has been commenced. It is expected that it will be issued in a few months. More than two thousand copies of the second edition were distributed during the year.

After having been laid aside for some time through pressure of work, the preparation of a complete list of all the maps and publications which have ever been issued by this branch has again been put in hand. It is hoped to have this completed in a short time.

From topographical maps prepared last year schemes of subdivision for the summer resorts at Clear lake in Riding Mountain forest reserve, and at Madge lake in Duck Mountains forest reserve No. 2 were laid out and instructions for the surveys issued. At Banff an extension was made to the subdivision in the villa-lot section in accordance with the design prepared by Mr. Mawson, the expert on town-planning. Plans of each of the seventeen blocks, on a scale of twenty feet to one inch, were made and from these all the information necessary for the execution of the survey was calculated. On the completion of the survey at Banff, the surveyor's returns were examined and a plan of the subdivision was compiled for publication. A plan was also prepared showing the topography of the south and west slopes of Tunnel mountain at Banff. The returns of the survey of the townsite of Woodhaven, on Bedwell bay, in fractional township west of township 39 west of the Coast meridian, were examined, and further instructions for this subdivision were prepared.

During the year four members of the staff of the division resigned and two were transferred to other branches. Three of these vacancies have been filled and it is expected that another will be filled shortly. This will bring the strength of the permanent staff to twenty-two which is two less than it was during the preceding year. In addition to this there are at present two temporary technical clerks.

DIVISION OF EXAMINATION OF SURVEYS.

(T. S. Nash, Chief of Division.)

The work of this division comprises the returns of survey of Dominion lands in Manitoba, Saskatchewan, Alberta, the Yukon and Northwest Territories, and in British Columbia, excepting township subdivision in the Railway Belt.

In addition to examining the correctness of the returns, all the required official plans are also prepared in this division.

Surveyors in the field are required to submit, from time to time, sketches showing the progress of their work. These are examined to see that correct methods are being employed and that satisfactory results are being obtained; 100 progress sketches from inspectors, 285 from contractors and 1,027 from men employed by the day were examined.

The investigation and retraverse of lakes and former lake beds by stadia was continued by twelve surveyors, and has now become established as a part of the work.

Owing to the staff being shorthanded, and to the desirability of issuing the amended township plans with as little delay as possible, these stadia surveyors were again permitted to prepare from their field notes the amended township plans. Their field notes and the township plans have been checked by the regular staff; 103 field books and 697 plots comprised the final returns of stadia surveys in 541 townships.

Including these stadia surveys, examination has been made of 810 subdivisions, 133 miscellaneous surveys and 563 township outlines. Memoranda on examination of returns were sent to the number of 349, and 325 replies were received and the necessary corrections made. The number of draft letters prepared was 2,254. Thirty contract accounts were prepared and closed as the work was shown by the inspectors' reports to be satisfactorily done. Compiled plans of 833 townships were completed, 248 of which were first edition plans. Compiled plans of 13 miscellaneous surveys and 11 settlements were also completed.

With regard to the Yukon Territory, sixty-two group lot surveys and seven base line and reference traverses were received and examined. Eighteen additional sheets of the Yukon map in the Stewart river district are almost completed.

Mineral claim surveys from the Beaver lake district in northern Saskatchewan have been dealt with to the number of forty-four, from Hudson bay thirty, and from other parts nine.

Inquiries from other branches of the department involved the writing of 324 memoranda, the preparation of 196 sketches and the calculation of 614 areas. The returns of seven timber berth surveys were examined and two timber berth plans prepared.

Plans of road diversions submitted by the provincial governments to the number of 541 have been examined and sent to be recorded. Of railways, eighty-five plans of right of way were examined, representing 3,045 miles of line. As two or more copies of many of these plans were submitted, the gross mileage of plans examined was 4,886.

The numerical strength of the staff which was formerly twenty-nine, is now reduced to twenty-four, of whom two have been on active military service since last August, and two have been absent on account of protracted illness.

DRAFTING AND PRINTING DIVISION.

(C. Engler, Chief of Division.)

Township Plans.

The preparation for printing of township plans constitutes the most important part of the work and takes up most of the time. During the year, 833 township plans have been prepared. Areas of lands patented are now omitted, so that as settlement proceeds the plans become simpler as regards areas shown. As the prepared copies after being photographed are filed for use in subsequent editions, and as we have now a large number of such copies, the work of preparing later editions is in many cases reduced; in others the changes required for the later editions are such as to call for complete new copies.

Closely connected with the preparation of plans of complete townships are occasional plans of small portions of them. These are asked for when it is desired to deal with a part of a township, and for some reason it is impossible to deal with the whole. An edition of such plans is not printed, but from four to six copies are made by hand.

The first plans of townships printed by the department were in colours to show topography. The editions of many of these have become exhausted, and it is necessary to reprint them. In some cases this has been done by simply photographing a print of the old edition, but where the colours do not permit of this being done the black portions of the plans are redrawn, photographed and printed, and the colours are then printed in the usual way.

Miscellaneous Surveys.

Twenty plans of such surveys were prepared. They include settlements, townsites, and subdivisions of which editions were printed, but do not include the occasional copies of plans made by hand for various purposes.

Surveyors' Sketch Maps.

In former years, our practice has been to print the sketch maps showing a surveyor's explorations for twelve miles on either side of base lines or meridians on a scale of six miles to an inch with an accompanying profile of the line on a vertical scale of 1,000 feet to an inch. The number of such maps has been increasing every year so that at last our facilities for printing them were greatly taxed; the cost of the paper was also a considerable item. It has therefore been decided to reduce the scales of these maps so that for the present issue they may be printed all on a single sheet, the horizontal scale being 12·5 miles to an inch and the vertical 2,000 feet to an inch. It may be remarked that while this reduction in scale saves printing and paper it increases the draughtsman's troubles as there is scarcely room for putting down legibly all the data to be shown. These maps are issued with the report of the branch.

Miscellaneous Work.

This department of the work is increasing every year and as each part of it requires individual treatment, the amount of time required is considerable. It includes fourteen plans to accompany Orders in Council, the mounting of seventy-six maps and the completing of 176 jobs of a miscellaneous character. The astronomical field tables have been rearranged and are now printed on three small folders instead of one as formerly.

BRITISH COLUMBIA SURVEYS DIVISION.

(E. L. Rowan-Legg, Chief of Division.)

The work of this division consists of the preparation of preliminary plans from sketches sent in by surveyors, showing the progress of their work in the field, the examination of surveyors' field notes and plots, the compiling of township and other plans, the comparing of fair copies of township and other plans and replying to requests for various information.

The work done has been as follows: Preliminary plans compiled, 107, and copies made, 180; surveyors' field notes of subdivision surveys examined, thirty-two, and plots fifty-one; mineral claims, eight; field books of miscellaneous surveys, seven, and plans twenty-six; township plans compiled, seventy-two; miscellaneous plans compiled, ten; townsite plans compiled, one; fair copies of compiled plans compared, eighty-three; various plots and sketches made, 228; odd jobs and requests for various information dealt with, 677; draft letters and memoranda written, 608.

In June, 1914, the inspector of surveys in the Railway Belt, British Columbia, reported that the field book in use was inadequate, as it did not contain more than one-third of the notes taken in the field.

Specimen pages for a new book were prepared and sent to the surveyors for their opinions and for suggestions for the improvement of these pages.

The surveyors were unanimously of the opinion that the proposed books would be a distinct improvement on the old ones, and they offered some valuable suggestions, which were acted upon in the preparation of the new books.

To replace the old book, these new books have been prepared, one for final returns, one for field use, and one for the recording of astronomical and magnetic observations.

The pages for field notes in the books for final returns and for field use are designed to contain the notes of either a section or a quarter-section boundary, and are ruled into squares to facilitate the recording of topographical features.

The opposite page is ruled to contain data for the calculation of horizontal and vertical distance.

Both books contain pages for calculation by latitudes and departures.

The book for field use contains blank pages interleaved for calculations appertaining to the field notes or the latitudes and departures. Waterproof detachable covers are provided with these books.

The book for recording astronomical and magnetic observations is made of pocket size, and contains ruled forms for entering observations for time and azimuth on the sun and stars and for variation of the compass needle.

Much time and thought were given to the preparation of these books so as to make them as complete and useful as possible.

The staff of this division has been reduced to four, one being absent on active military service.

SECTIONAL MAP DIVISION.

(J. Smith, Chief of Division.)

Compiling Room.

The compiling of new sectional maps and the revision of those already issued in order to keep them up-to-date, forms the chief work of this room. During the year, seven new sheets were compiled, and revised editions were prepared of fifty-five sheets. Plotting is done on a scale of two miles to one inch, and every effort is made to secure all available information.

The chief sources of information are the following:—

(1) Township plans, settlement plans, townsite plans, etc.; also field books and reports sent in by surveyors. Eight hundred and seven such were examined during the year.

(2) Railway location and construction plans on file with the Railway Commission. Eighty-seven plans were borrowed and used during the year. The working time-tables of the railroads were also searched for names and positions of stations.

(3) Until this year information relative to the positions of post-offices was furnished by the officials of the Post Office Department on cards supplied for the purpose. A new method is now being employed. When a sectional map is about to be revised a diagram is made out for each post-office and mailed direct to the postmaster with a request to check it over and make any corrections necessary. Considerable correspondence is involved, but the results are proving satisfactory. Four hundred and two of such cards and diagrams were received, and the information plotted.

(4) Seventy-nine plans and blue-prints of Indian reserves, forest reserves and Dominion parks were received and used in compilation.

(5) Road diversions are being constantly made by the provincial governments, and plans of these are filed with the Survey Records Branch. Four hundred and twenty-seven such plans were received and plotted.

(6) Valuable information was secured from sketch maps furnished by base-line surveyors and from maps and reports of the Geological Survey, Irrigation Branch, Chief Geographer's office, etc.; for sheets lying partly in British Columbia, maps published by the Government of that province were searched. Three hundred and sixty-eight of these miscellaneous maps, sketches and reports were utilized.

In addition to the work outlined above, this office compiles and edits the yearly pamphlets containing reports of surveyors. Reports received from surveyors from July 1, 1913, to July 1, 1914, were compiled and sent to print and have since been

issued in five pamphlets, totalling 208 pages. Work was also begun on the pamphlets containing reports for the period from July 1, 1914, to March 31, 1915.

Since the initiation of the surveys of Dominion lands, surveyors have been required to make reports on townships covered by their surveys. In 1886 the reports received up to that time were issued in five pamphlets. From that date until 1903 the township reports were not issued at all. In 1903 they began to be printed as part of the annual report of the Topographical Surveys Branch, and since 1909 they have been published in yearly pamphlets.

It is proposed now to combine into volumes of convenient size all the township reports received to date, and it is estimated that twenty volumes of about 250 pages each will be required. The first of these, comprising all reports on townships east of the Principal meridian, has been compiled and sent to the printer; another is ready to send, and two others are in hand.

The work of examining the sketch maps sent in by base-line surveyors which was formerly done in another division of the branch was taken over by this division in November, and has since that time kept one man constantly employed. Thirty-four such sketch maps have been received and examined and compared with the surveyors' field notes. Tracings of these have also been made for blue-printing.

Mapping Room.

The usual work on the sectional maps has been continued.

Eight sheets have been reprinted without being revised, fifteen sheets have been revised and reprinted, and fourteen new sheets, covering an area of about fifty-one thousand square miles have been published.

A map of "Banff and vicinity," was also prepared and published on a scale of one mile to an inch; this map shows the Bow valley, and adjacent country from "The Gap" to Castle mountain.

A map defining the boundary between British Columbia and Alberta, on a scale of one mile to an inch, is being made but is not yet completed.

The permanent staff consists of eighteen clerks, an increase of two over that of last year.

SPECIAL SURVEYS DIVISION.

(G. Blanchard Dodge, Chief of Division.)

Base-Line Surveys.

The investigation of base lines and meridians for the purpose of locating and correcting errors of survey has been continued, and a surveyor has been employed in the field in retracing lines on which errors have been found to exist.

This work was begun in 1912 after it became known that some large errors existed among the older surveys in and around Manitoba, and the work has since been gradually extended to include all base lines and meridians so far surveyed. This work has been considerable, for in order to make the investigation of the bases and meridians complete many outlines in addition required to be examined, and the bases and meridians alone aggregate some 19,000 miles. For areas covered by recent surveys this work can be done with comparative rapidity, but among the older surveys, where measurements were not always accurate and entries in the surveyors' field notes often purely conventional, the work is multiplied many times.

On all the bases and meridians, complete returns of survey require to be examined, correspondence files read, theoretic as well as chained distances computed, bearings examined and deflections computed, corrections for elevation above sea-level and for latitude applied, block closings checked, results of latitude observations compared with the results of line surveys, widths of fractional ranges computed, chained lengths of bases between meridians compared with corresponding theoretic lengths, and finally the location, magnitude, direction and cause of any errors determined.

From the results of this work, sketch maps are in course of preparation showing the positions on the ground of all surveyed bases relatively to where they should be, and the differences in latitude between surveyed, theoretic, and sea-level values of each. In this way the framework of a system of control is being formulated which it is hoped will prove efficient.

Besides the investigation of base lines already run, this work includes also the draughting of technical instructions to surveyors making surveys of new bases and to surveyors making retracements of old lines for the purpose of locating or correcting errors.

Astronomical Work.

Azimuth Observations.—During the year the observations for the azimuth of base lines and meridians taken during the season 1913 and 1914 have been received and examined. The same high degree of accuracy found in the returns of the previous year is shown in these results. The errors existing in the bearing of the line are now very small, seldom more than 10″, this being due to the frequency with which observations are taken, the accuracy of the observations, the care taken in applying the correction and the precision with which the line is run.

The new base-line transits are well adapted to the work. The horizontal circle is graduated every 5′ and is read by two micrometer microscopes having a magnifying power of about 53. The micrometer head is divided into 60 equal parts, each division corresponding to 5″ and the readings are estimated to seconds. The telescope is fitted with a micrometer eye-piece. As this eye-piece can be rotated in a plane perpendicular to the optical axis of the telescope, it may be conveniently used for measuring both horizontal and vertical small angles such as for azimuth observations when running a meridian, the telemetric measurement of distances and for latitude observations by Talcott's method. Azimuth observations are generally taken in daylight, but for latitude or other work desired at night the instrument is fitted with a complete system of electric illumination. A full description of the instrument is in course of preparation, and will be published in monograph form.

Latitude Observations.—Checks on the positions of base lines in the district between lake Athabaska and British Columbia were required, and a surveyor took observations for latitude with the zenith telescope at four points therein. The results of these observations when checked and the necessary computations made, were found to be satisfactory. No large errors were found to exist in the latitudes of the bases.

Astronomical Field Tables.—The astronomical field tables for the year have been prepared and issued. The field tables were first issued in 1903, when they were made out for periods of six successive months; they were set up in type and printed on a single sheet of strong paper, fifteen by six inches, folding to three by six inches for the pocket, and contained a table for finding the pole star and the astronomical meridian, a list of time stars, a table of the sun's apparent right ascension, a small map showing approximate magnetic bearings of astronomical north in western Canada, and diagram showing at a glance the latitude, longitude, and convergence of meridians for any point of the system up to township 80. It was then thought that the field tables would greatly simplify the taking of astronomical observations for azimuth. They were greatly appreciated by surveyors and were soon found to make possible a distinct increase in the accuracy of subdivision surveys. They are now of such service to surveyors as to be considered indispensable. Numerous changes have been made since their first appearance however. Each set of tables for the azimuth of Polaris is now made to cover either two periods of three consecutive months or three periods of two consecutive months in successive years. The reason for this is that the position of Polaris for a given period in one year is approximately the same as its position for a different period in the preceding or following year, so that by a judicious combination of months in different years a great increase in the accuracy of the tables is obtained.

The gradual northward advance of settlement, which of course must be preceded by the surveyors, has neeessitated the tables and diagrams being extended as far north as township 140, and the better class of instruments now used has made desirable the addition of many stars of the second and third magnitude to the list of time stars.

Delay in issuing the tables is avoided by having prepared special printed forms on which the variable matter of the tables is stamped as soon as obtained from the computing office, and the finished table is then reduced and printed by photo-zincography.

As explained in last year's report, it is now necessary to issue the field tables in two sets, one set giving data for the reduction of stellar observations, and the other giving data for solar observations. Each is printed on sheets of strong paper, sixteen by six inches, folding to pocket size of four by six inches.

The diagrammatic map giving the astronomical bearings of magnetic north in western Canada is now omitted from the field tables. It was necessarily of a very rough and approximate nature, as until recently very little information has been available on this subject. The large amount of data respecting magnetic declination at points in the western provinces, which have been obtained from surveyors in recent years, has made possible a much more accurate representation of the isogonic lines over western Canada. A map has been compiled on a much larger scale than the former one, showing the results of this magnetic work. It is printed on stiff cardboard of convenient pocket size.

The extension of the tables for the azimuth of Polaris, and the peculiar effects which the phenomena of precession and nutation have upon the apparent motion of Polaris, have made necessary an investigation into the accuracy of the tables as they are now presented, and the advisability of increasing their accuracy by some radical change in the form of the tables. This has been done during the year. The maximum error of the tables for township 140 exceeds half a minute on only a few days of the year, and for but a few hours on each of these days. At all other times the error is well under half a minute. The errors for the more southern townships are less than for township 140; thus, the errors of the tabulated figures for township 80 rarely approach and never exceed half a minute of arc, while those for townships farther south are still less. This gives a sufficient accuracy for ordinary subdivision and traverse work, and it was therefore decided that no change in the field tables is yet required. It has also been shown that any desired increase in the accuracy of the tables could only be obtained by adopting a much less convenient arrangement than the present one, or by greatly increasing the frequency with which the tables are issued, with a consequent increase in the computing. Some such change may become necessary in the future.

Magnetic Survey.

Fifty surveyors were instructed to observe for magnetic declination and during the miscellaneous surveys made by R. C. Purser, D.L.S., observations for magnetic dip and total force were taken at twelve stations. The results are given in Appendix 62.

During the season of 1913, R. C. Purser, D.L.S., and G. A. Bennett, D.L.S., were both engaged in taking observations for magnetic dip and total force, but this season owing to the nature of his work, Mr. Bennett was not available. This accounts for the smaller number of observations taken this year.

Every observation for magnetic dip and total force consisted of a dip, a total force, and a dip, the mean dip being used in working out the total force. This complete observation was duplicated at every station, and the average range found to be comparatively small. The instrument used was a Dover dip circle, the total force constant of which was determined both at the beginning and end of the survey season. This constant was the mean of at least six observations, and the probable error in each case was less than ·0001 c.g.s.

The index correction to the compass of every transit used for observing was determined both at the beginning and end of the survey season. If a serious discrepancy was found between the two determinations, it was investigated, and unless the discrepancy could be satisfactorily explained, the observations taken with the instrument were rejected. Every observation for magnetic declination has been checked and plotted on a large-scale map. They also have been reduced to the mean of the month in which they were taken, by means of the daily records of the declinometer at Agincourt, except those that were taken at times when the records were not observed. In the appendix, those observations that are not reduced to the mean of the month are marked by an asterisk.

Returns of magnetic declination received to date for 1914	1,439
Previous returns since 1908	5,414
Total returns to date	6,853
Dip observations received for 1914	62
Previous returns since 1908	289
Total force observations for 1914	46
Previous returns since 1908	214

Surveying Instruments.

The instrumental equipment of the surveyors employed in the field was inspected during the year, and those whose equipment was not satisfactory were required to provide themselves with approved instruments.

Repairs were made to fifty-five transit theodolites, twenty-seven dumpy levels, twelve surveying aneroids, one zenith telescope, six rod levels, nine cameras, two stadia rods, three precise levelling rods, and three clinometers.

Thirty-three sidereal watches and one box chronometer were overhauled and readjusted.

The surveying instruments shipped during the year comprised 285 packages weighing 15,126 pounds, while 225 packages weighing 12,732 pounds were received.

A statement of the surveying instruments on hand on March 31, 1915, showing also the instruments purchased and sold during the year, is given in Appendix 64.

Surveys Laboratory.

The regular work of the Surveys Laboratory during the past year has included complete tests of one block survey transit, forty-two D.L.S. subdivision transits, one alidade, and six levels. Partial tests were made of one block survey transit and twenty-eight D.L.S. subdivision transits. The index corrections of nineteen aneroids, the value per turn of five microscope screws, the linear distance between cross hairs of four extra diaphragms, and two level values were determined. Besides the above, thirty-eight sidereal watches have been submitted for trial.

For the past two years a number of parties have been engaged in the field in making traverses of lakes. The stadia has been found to be the most rapid and convenient method of doing this work, and has been used exclusively. The stadia constants of each instrument used are determined at the Surveys Laboratory, and stadia correction tables were computed and printed for the use of the surveyors in the field. Fifty-one such cards in all were printed.

In connection with the testing and rating of the watches and laboratory time pieces, twenty-seven time observations were taken.

Of the thirty-eight watches tested, twenty-six were new and twelve had been previously tested, rejected, and returned to the makers for readjustment. There were fifteen watches which passed the test, seven of them being new and eight old, i.e., thirty-nine per cent passed as against fifty-seven per cent in 1914.

The results of the trials of the fifteen watches which passed are given in Appendix 63.

The watches tested and supplied to surveyors are cheap ones, costing only $45. Better watches are not procured because it is inevitable that in the course of a surveyor's operations the watch may be submitted to extreme cold, and the finer watches would become no better than the cheaper ones. The conditions of the test were given in our report of last year. All watches which are successful in passing the "Standard of Test" are given marks for isochronism, position, adjustment, and temperature compensation as follows:—

With the theoretically perfect watch α would be $= 0$ and would get 400 mks.
β " $= 0$ " " 400 "
γ " $= 0$ " " 200 "

A watch which had just succeeded in passing the "Standard of Test" would have:—

$= 0.75$ and would get 0 marks.
$= 3.5$ " " 0 "
$= 0.3$ " " 0 "

Denoting by X, Y, Z, the corresponding numbers merited by the watch

$$X = \tfrac{1600}{3}\ (0.75 - \alpha)$$
$$Y = \tfrac{800}{3}\ (3.50 - \beta)$$
$$Z = \tfrac{2000}{3}\ (0.30 - \gamma)$$

and the total marks for the watch:—

$$S = X + Y + Z.$$

For the fifteen watches which passed, the average errors for isochronism were as follows:—

P.U.	P.R.	P.L.	D.U. 40°	D.U. 65°	D.U. 90°	D.D.	P.U.
0s.54	0s.53	0s.54	0s.65	0s.53	0s.52	0s.41	0s.54

The smallest error for α was 0s 41.

The average errors for position were:—

P.U.	P.R.	P.L.	D.U.	D.D.
1s.53	2s.68	3s.02	1s.43	1s.49

The smallest error for β was 1s.23.

The average temperature coefficient was 0s.08, two watches have coefficients of only 0s.02.

Comparing the average errors of the watches which passed with those for 1913 and 1914, we have the following:—

——	1913.	1914.	191
Average error for isochronism	0s.59	0s.45	0s.53
" " position	2·58	2·03	1 89
" " compensation	0·14	0·10	0·08

As noted in 1914, the lowest average error in isochronism for both the watches which passed the test and those which failed was in the D.D. position. The largest average error in isochronism is for those which passed, as in 1914, in the P.U. position, but for those which failed, the largest error is in the P.R. position. In position, the largest average both for those which passed and those which failed is in the P.L.

position. Of the twenty-three watches which failed: four, or seventeen per cent, failed in isochronism; fourteen, or sixty-one per cent in position; and five, or twenty-two per cent, in both isochronism and position. All passed the test for temperature compensation.

At the Comparator building, the lengths and weights of ninety-four tapes of all kinds, and two invar wires were determined. Fifty-eight intercomparisons of the laboratory standards were made, and two precise levelling rods were tested.

The comparator base was verified twenty-five times by the standard four-metre rule. The first verification was made in September, and they have been made at regular intervals of time since. They appear to show a regular long period change in the length of the base. When a longer interval of time has elapsed we will be in a better position to make a study of this change.

The work of improving the apparatus has been carried forward as far as time would permit. At the Surveys Laboratory besides minor improvements, an air pump of the water-jet type has just been installed whereby reduced pressures may be maintained for extended periods in the air receiver. This apparatus will enable a more thorough examination of the behaviour of aneroid barometers to be made than has been hitherto possible.

When the Comparator building was erected, the intention was to heat it by gas. This has been tried but has not proved a success. The fumes from the gas affected the apparatus and made the room very trying to work in. It was decided therefore to try electric heating. The full system consists of heaters and automatic control. At the present time, we have only the heaters. But even this is a great improvement, and has given good satisfaction. With care the building is capable of quite close regulation, and the daily temperature of the test room may be controlled within a small range. Tests can now be carried on at a practically uniform temperature very close to 62° Fahrenheit except during the extreme summer weather. We hope later to be able to install the automatic control, when still better results are expected. The cost of the electric heating has proved to be not any greater than that by gas. Between tests in the warm weather the ventilators and air intakes are closed during the day, and opened at night, when a current of cool air is forced through the building by means of blower fans. The extremely well insulated walls and ceiling usually prevent any excessive rise in temperature during the daytime.

The apparatus installed in the Comparator building, for the testing of measures of length, will be fully described elsewhere. In addition to the regular tests, some important experimental work has been done. The object of this was to investigate the characteristics of the apparatus, and the degree of precision which might be expected from it. That part of the work referring to the comparator base is not yet complete, but some interesting results have already been attained on the secondary apparatus. These go to show that this is capable of giving results beyond our best hopes and of a degree of accuracy far greater than that needed for most practical purposes.

In comparing tapes directly with the bench-marks, many precautions are entailed, and it was decided therefore that a secondary apparatus should be constructed so that surveying tapes might be quickly and accurately compared with the laboratory standards, which in turn are periodically referred to the bench-marks. Briefly, this apparatus consists of a series of pulleys, mounted in pairs, so that the two tapes are supported independently. At the ends are grooved pulleys supporting the wires imparting tension to the tapes, the tension being applied by means of weights. Micrometer microscopes at the two ends of the tape are used in making comparisons. The zeros of the tape and standard are brought into coincidence under one microscope, and readings are taken with the other. The supporting pulleys are spaced one hundred inches apart . With this spacing, the effect of differential sag may be neglected when the weights of the tapes agree within certain ordinary amounts. But the increased

friction due to the introduction of a large number of pulleys may prove to be a source of error sufficient to more than offset any erors that may arise from an erroneous correction for differential sag. If the apparatus is to be efficient, the friction must be reduced to a minimum. This point was kept in view during the design and construction of the apparatus. How successful was the result may be gauged from the tests which follow and also from the fact that it was found necessary to apply the tension weights at but one end, otherwise the tapes would not maintain their relative position for the short space of time required to take readings. As in use at present, the zero end of the standard is attached to a fixed point and that of the tapes to a slider having a fine longitudinal screw adjustment. The pulleys are of the lightest possible design consistent with the neeessary strength and were carefully machined. They are mounted on ball bearings, also accurately made and adjusted.

The object of the experiments described below was to find out the amount by which the friction in the apparatus would affect the results obtained in the standardization of tapes.

The first test consisted in finding the force necessary to overcome friction in the apparatus. This was first done with the tape hanging in a single catenary, so that only the two grooved tension pulleys were involved, and then a similar test was made with the addition that the tape was supported along the intermediate pulleys. A sixty-six-foot steel tape was used in these tests, which were carried out with both a wire and a cord passed over the tension pulley. The pulleys were set in four positions 90° apart, and weights were added at one end until the tape began to move. The experiment was then repeated with every condition the same save that weights were added at the other end.

The following shows the results:—

Friction Test.—To determine the amount of friction in secondary apparatus. Tape: Steel tape, sixty-six feet under tension of ten pounds. (Cord connection.)

Average weight added for four positions of pulleys:—

End Pulleys only—

Weight added at pulley A	0·019	pounds.
" " " C	0·011	"
Mean for two ends	0·015	"

Friction for one pulley only=0·008 pounds.

End Pulleys and nine intermediate pulleys—

Weight added at pulley A	0·023	pounds.
" " " C	0·016	"
Mean for two ends	0·020	"

(Friction for two end pulleys and nine intermediate pulleys.)

Alteration in tension due to one end pulley, and nine intermediate pulleys, 0·012 pounds. (Working conditions.)

These results were obtained on the inner set of pulleys, used to support the standard. A similar determination for the outer set gave a value of 0·015 pounds for one end and nine intermediate pulleys. Using wire connections instead of cord for the tension weights, values of 0·014 pounds were obtained for each set.

This amount is seen to be very small. The correction to be applied from this source of error in testing a sixty-six-foot tape under the above conditions would amount to but approximately 1 in 10,000,000.

The test, though satisfactory from this point of view, gives no direct indication of the effect of friction on the determination of the length of a tape, and therefore a second series of experiments was made in order to detect, if possible, the exact amount by which readings are affected by friction in the apparatus. The tape and

standard were suspended on intermediate pulleys exactly as when making a regular test, and readings were taken first by bringing the zeros into coincidence from left to right and then in the opposite direction. When moved towards the zero by means of the adjusting screw, the tension at the zero end will be the sum of the weight and the friction in the pulleys; if the tape is moved in the other direction the tension at the zero end will be the difference of these. This difference in tension, if large enough to affect the readings, would cause the tape to show longer when moved towards the zero end than when moved in the opposite direction.

Tests were made on a sixty-six-foot tape, under tensions of ten pounds and ten kgs., and with a 100-foot tape under similar tensions. The two observers each made five settings and then changed places, so that, as far as possible, personal equations were eliminated. Three complete determinations were made under each of the above conditions; a typical example is recorded as follows:—

Friction Test.—To determine influence of friction on comparisons made with Secondary Apparatus:—

Steel tape, 100′ T S 863. Compared with T S 805 (laboratory standard tape.)

Tension=ten pounds.

Settings toward Zero—Microscope readings.			Settings from Zero—Microscope readings.		
Standard.	(Obs.—W. G. H.)	Tape.	Standard.	(Obs.—W. G. H.)	Tape.
7·797mm		8·529mm	7·785mm		8·503mm
·795		·527	·785		·511
·796		·531	·784		·511
·794		·533	·785		·512
·797		·535	·788		·512
	(Obs.—W. J. L.)			(Obs.—W. J. L.)	
7·805		8·522	7·805		8·520
·806		·529	·803		·525
·801		·525	·803		·529
·808		·530	·802		·528
·810		·529	·805		·526
Average value, tape longer than standard by 0·728mm.			Average value, tape longer than standard by 0·724mm.		

Tape apparently ·004mm longer when brought towards zero.

The following is a summary of all the tests:—

Friction Test.—To determine influence of friction on readings obtained with Secondary Apparatus:—

Conditions.	Variation of tape from standard.		Difference.
	To zero.	From zero.	
	mm	mm	mm
66′ steel tape. Tension=10 lbs.	0·145	0·138	0·007
	0·148	0·140	0·008
	0·170	0·168	0·002
66′ steel tape. Tension=10 kgs.	3·125	3·115	0·010
	3·120	3·114	0·006
	3·122	3·112	0·010
100′ steel tape. Tension=10 lbs.	0·728	0·724	0·004
	0·729	0·727	0·002
	0·731	0·726	0·005
100′ steel tape. Tension=10 kgs.	0·096	0·080	0·016
	0·099	0·085	0·014
	0·101	0·092	0·009

Although it appears possible to detect the effect of friction in the above, yet this is very small. In the example completely recorded, which shows the usual variation in a set of individual readings, the tape is apparently longer by ·004^{mm} when brought towards the zero. This is double the friction error and would cause an apparent error in the length of the tape of about 1 in 15,000,000. The various other tests give a maximum error of approximately 1 in 4,000,000.

The results tend to show that the friction is extremely small, and the slight influence on readings is within the degree of accuracy which is desired for any comparison on the secondary apparatus.

Correspondence.

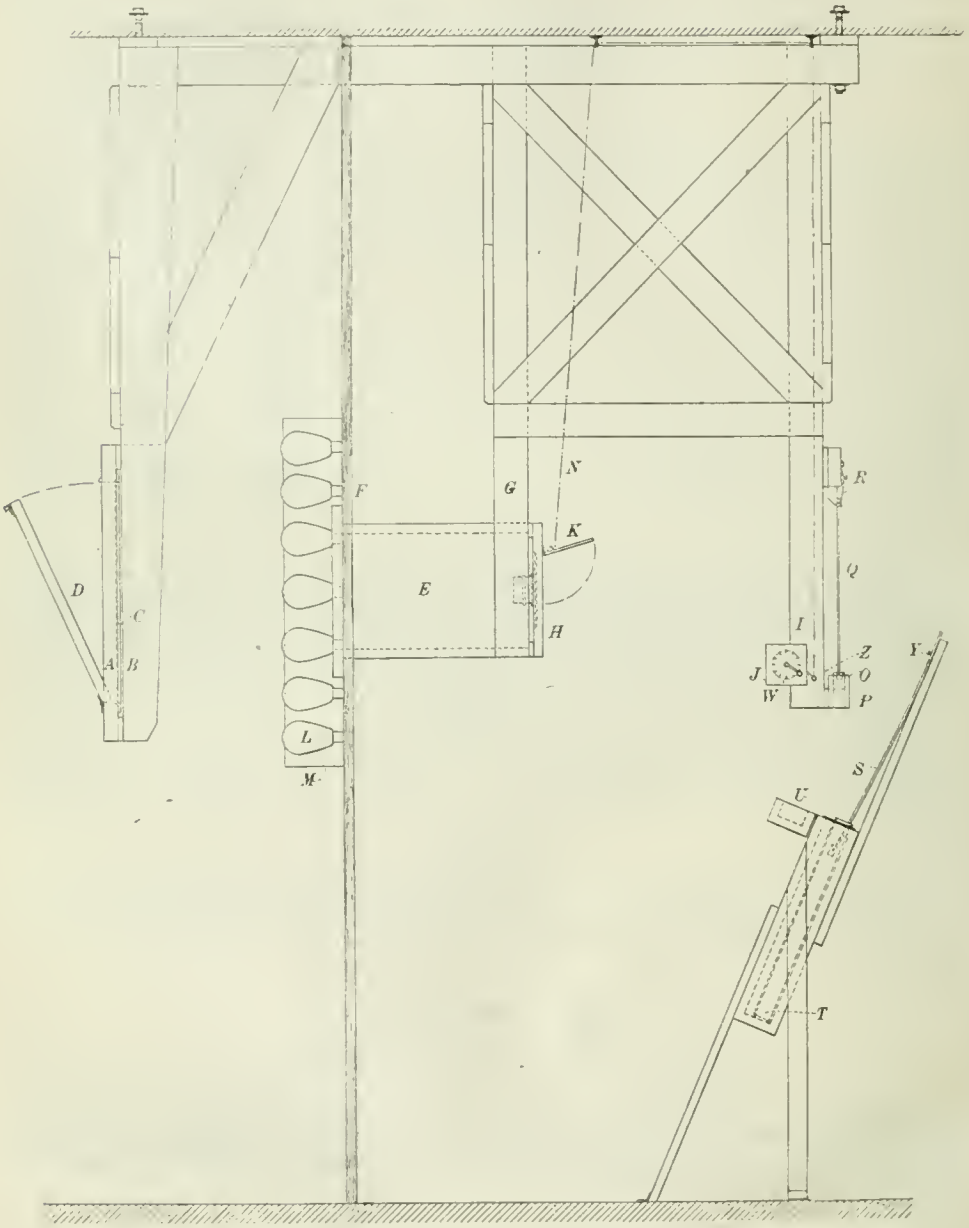
The number of draft letters prepared was 1,612. Sixty-four letters of instruction to surveyors were prepared, and 454 memoranda written.

PHOTOLITHOGRAPHIC OFFICE.

(H. K. Carruthers, Process Photographer.)

The work of this office has increased so much that it was necessary to install a second copying camera, and as the townships, which are of a standard size and reduction, comprise most of the work, it was decided to make it a fixed focus camera to take care of this particular work.

A space in one corner of the room seven feet by thirteen feet was partitioned off and the camera hung partly in and partly out of this room.



This cut shows a vertical section of the apparatus, and is as follows:—

On the ceiling is bolted a heavy pine frame from which project the arms B, G, and I.

On the arms B, which are outside the partition F, is fastened the copyholder A. This holder has a plate glass C fastened to the inside face, and against this glass the copy is held by the pressure from the hinged panel D.

The lens box E is screwed to the partition F, and on both sides of this box-opening is arranged fourteen 110-volt 200-watt high efficiency Tungsten lamps L with two reflecting mirrors M.

The arms G carry the lens board H and, to avoid vibration, hang free of the lens box.

As the exposure is made in the dark-room, a plate holder is unnecessary.

A glass plate is coated with collodion and placed on the ebonite dipper S, then lowered into the silver bath T. The hinged lid U is turned over into place to exclude light and dust.

After sensitizing is completed, which requires about four minutes' immersion, the plate is drawn up and the dipper S hung on hook Y to permit of the excess silver draining back into the bath. Before raising the plate the room is darkened, sufficient light coming through a large ruby glass window.

The plate is now taken off the dipper and placed in position for exposure.

On the arms I are wooden blocks P which are cut out to receive the ebonite plate-rest O. On this plate-rest the sensitized plate Q is laid and held firmly in position by the sliding catch R.

Directly behind the plate within arms' reach is the switch which controls the lamps L.

The exposure is timed by a Warwick meter J. The hand W being set, all that remains is to pull down the lever Z. This pulls the cord N and raises the lens cap K. When the hand W travels back to zero the lever Z is automatically released, closing the lens cap K.

The regular procedure is followed in developing and fixing the plate.

The developing trays and sink, being about three feet from the camera, considerable walking is saved, and the negatives are made more expeditiously.

A new marble switchboard with ammeter and rheostats was installed, adding materially to the safety and convenience of the numerous arc and other lamps, mercury tubes, etc., used in the office.

Hill work on the three-mile sectional maps which is in black on the old manuscripts, is now printed in brown. To avoid redrawing the sheets, the hills are stopped out on the negative by the retouchers.

The hill work is drawn separately on tracing linen by the draughting division in exact register with the black.

During the year a retoucher was added to the staff, bringing the total number up to eight, of whom one is absent on active military duty. A schedule of the work for the year is given in Appendix No. 6.

PHOTOGRAPHIC OFFICE.

(J. Woodruff, Chief Photographer.)

The output of the photographic office shows a decrease as compared with last year. This is principally in the smaller sizes of velox prints and negatives, large numbers of which were formerly printed and developed for other branches of the service. This work had to be discontinued owing to the increasing size of and the longer time demanded by our own work, so that although the number of items is less than last year, the amount of work done is really greater.

In Vandyke and blue-print work only such sizes as can be conveniently handled in the limited space at our disposal are now done here, the very large tracings being sent to the Railway Lands Branch, where special equipment is available for doing such work.

On the fixed focus enlarging camera, nearly 2,000 enlargements were made. This camera is used only for enlarging from topographical survey negatives. These are enlarged to a standard size of ten by fourteen inches on bromide paper, and the prints are used in plotting the survey.

This camera, which has been in use for many years, has been entirely remodelled in preparation for next season's work. The method of illuminating the negative has been changed. Four powerful nitrogen-filled Tungsten lamps are now used, and this together with a new lens has much improved the definition of the enlarged image. A new negative holder has also been added, which is unique in construction and a big improvement on the old one.

The changes will facilitate the working of the camera as well as improve the quality of the work.

The new enlarging camera which was installed last year, and of which a description was given in the report, has proved most satisfactory and is a great help in getting out the work of the office promptly.

The staff remains the same as last year, viz., one photographer and four assistants. A schedule of the year's work accompanies this report.

LITHOGRAPHIC OFFICE.

(A. Moody, Foreman).

Appendix No. 8 shows an increase of output over last year, the monthly average of plans printed being over 111, and the number of copies over 35,000. Many of these plans were printed in several colours, making the number of runs on the two power presses about 70,000. This is by no means a large run for two presses, but as the number of copies from each map or plan is small a considerable amount of time is spent in changing from one plate to another and again from one colour to another.

In addition to the regular work of this office, maps and plans have been printed for several other branches of the department, including maps of forest reserves for the Forestry Branch, plans to accompany Orders in Council for the Ordnance Lands Branch, and maps for the International Waterways Commission.

The printing of sectional maps on the three-mile scale in colours is being gradually carried out. For a time they were printed in black with a tint of blue for water areas. The next step was to print hills in brown and still later a green was added for forest reserves. These colours add greatly to the appearance and to the clearness of the maps, as well as to the work of the printers, the plates for all flat tints having to be made by them. The same is true also of the reprinting of plans of townships formerly issued in colours; here again all the colours, *i.e.*, all the work except the black is done by the printers.

Owing to increase of work generally an additional transferrer was engaged.

GEOGRAPHIC NOMENCLATURE.

Mr. Whitcher, who has charge of this branch of work in the department, reports the usual examination of all the sketch maps, compiled township plans, sectional, and other maps, surveyors' reports, etc., and has also continued to act as a member and secretary of the Geographic Board of Canada. The annual report of the board, which is still published as a supplement to the annual report of this department, is now closed at the expiration of the fiscal year, instead of the former date, June 30, and includes all decisions rendered during the year, which had been previously published in *The Canada Gazette* and in bulletin form. The report was printed in English and French and largely distributed to Dominion and provincial officials, geographical societies, colleges and schools.

SESSIONAL PAPER No. 25b

BOARD OF EXAMINERS FOR DOMINION LAND SURVEYORS.

(J. Aurele Cote, Secretary.)

The Board of Examiners for Dominion Land Surveyors held three meetings during the year. The first was a special meeting lasting from April 28 to June 4 (inclusive), 1914, during which examinations were held at Ottawa, Toronto, Winnipeg, Regina, Calgary, and Edmonton. The second was another special meeting which took place on September 23, 1914. The third was the regular annual meeting called for by section 9 of the Dominion Lands Surveys Act. It began on Monday, February 8, 1915, and lasted until March 26, 1915. During this meeting examinations were held at Ottawa, Kingston, Montreal, Toronto, Winnipeg, Calgary, Edmonton, and Dawson. The total number of candidiates for examination was 280. Of these, 201 tried the preliminary examination, seventy-three tried the final examination, and six tried the examination for Dominion Topographical Surveyor.

Twenty-eight candidates were successful at the preliminary examination as follows:—

Preliminary Examination.

Alberga, George Frederick, Montreal, Que.
Bradley, Nicholas Hilburn, Calgary, Alta.
Brown, Leo. B., Holden, Alta.
Burchnall, Ralph Parker, Calgary, Alta.
Burn, George Augustus Harold, Janetville, Ont.
Bysshe, Gordon Thomas, Ottawa, Ont.
Cormack, Alexander, Edmonton, Alta.
Cox, Arthur George, Ottawa, Ont.
Caughlan, John Q., Chipman, Alta.
Crain, G. E., Ottawa, Ont.
Duncan, Stuart MacPherson, Ottawa, Ont.
Fraser, Andrew Stockwell, Ottawa, Ont.
Greig, Joseph W., Kingston, Ont.
Hemmerich, George, Conestogo, Ont.
Hogarty, Bertrand B., Winnipeg Man.
Jones, J. Donovan, Amherst, N.S.
McKittrick, Ernest S., Edmonton, Alta.
Meikle, MacKay, Ottawa, Ont.
Murphy, Charles Homan, Edmonton, Alta.
Nesbitt, Francis Grey, Sherbrooke, Que.
O'Brien, J. Edwin, Toronto, Ont.
Orr, William S., Cobourg, Ont.
Pringle, John Earle, Hamilton Ont.
Racknow, Ernest, Princeton, Ont.
Scott, Russell George, Toronto, Ont.
Somerville, William Johnston, Ottawa, Ont.
Throop, Wilfred Earle, Brockville, Ont.
Walcot, John Bevan, Montreal, Que.

Forty-two candidates were successful at the final examination as follows:—

Final Examination.

Alexander, John Bentley, Vancouver, B.C.
Beatty, Frank Weldon, Pembroke, Ont.
Beatty, William Benjamin, Sarnia, Ont.
Benner, James King, Alvinston, Ont.
Beresford, Herbert Graham, Winnipeg, Man.
Browne, Ernest Frank, Ottawa, Ont.
Brown, Lindsay Osborne, Ottawa, Ont.
Brown, Milton, Kitscoty, Alta.
Carson, John Alton, Vancouver, B.C.
Child, Cyril George, Calgary, Alta.
Coltham, James Thomas, Aurora, Ont.
Crowther, Keston Nelson, Qu'Appelle, Sask.
Crouch, Milton Edwin, Toronto, Ont.
Doze, Joseph Wilbert, Fort Saskatchewan, Alta.
Draper, Walter Harold, Edmonton, Alta.
Duffield, Hugh J., Calgary, Alta.
Ewing, Ernest Olliphant, Toronto, Ont.
Finnie, Oswald Sterling, Ottawa, Ont.
Gass, Lawrence Henderson, Iroquois, Ont.
Gibson Morton Milne, Willowdale, Ont.
Gorman, Arthur Oswald, Buckingham, Que.
Gourley, Robert Murray, North Bay, Ont.
Hardonin, Joseph, Calgary, Alta.
Harper, Clarence Johnston, Orangeville, Ont.
Hellferth, John Benedictus, Toronto, Ont.
Hotchkiss, Cyrus Percival, Edmonton, Alta.
Kinnear, Louis Arthur, Port Colborne, Ont.
Leitch, John Strickland, Calgary, Alta.
Lumb, William Ewart, Fort Stewart, Ont.
MacLeod, David Douglas, Park Hill, Ont.
McCloskey, Michael D'Arcy, Chelsea, Que.
McKusker, Knox Freeman, St. Louis de Gonzaque, Que.
Meikle, Angus Urquhart, Kingston, Ont.
Melrose, Thomas Montague, Coaticook, Que.
Moran, Patrick Joseph, Kingston, Ont.
Perron, Hermel Marie, Edmonton, Alta.
Robinson, William Earl, Columbus, Ont.
Scott, Buckton Arthur, Essex, England.
Shaver, Peter Albert, Calgary Alta.
Smith, Neville Herbert, Ottawa, Ont.
Venney, Leonard Thomas, Brockville, Ont.
Zinkan, William Edward, Southampton, Ont.

The time of the board, during the meetings, was largely taken up with the reading and valuation of the candidates' answer-papers. Complete sets of question papers,

to be used at the next examination were also prepared. In addition to this, the evidence submitted by candidates at the final examination, in proof of their eligibility therefor, had to be examined. This evidence consisted of certificates of provincial land surveyors and of affidavits of service under articles or apprenticeship.

Four candidates, who presented themselves for final examination, had not quite completed their time under articles. They were admitted on the understanding that, in case they were successful, their commissions would not issue until they had completed their apprenticeship and furnished affidavits in the regular form.

The board had to consider several applications which were received from college and university graduates asking to be admitted to the privileges of section 22 of the Surveys Act which provides for a shorter term of service under articles.

The Board of Examiners, wishing to facilitate in every way the enlistment for active service of articled pupils, gave the following decision at one of its meetings: "That in all cases where a candidate is articled to a Dominion land surveyor, time spent on active military duty would count as office time under articles to a Dominion land surveyor, but not as field time."

During the year a new edition of the "Rules and Regulations of the Board" was published. This edition is known as the "Ninth Edition," and contains several amendments to the former publication. Previously, marks were allotted to the various subjects in the order of importance, while now one hundred marks are allotted to each subject. This arrangement facilitates greatly the marking of the papers.

Forty-one commissions were issued to candidates who had passed the final examination, and had furnished oaths of office and allegiance and bonds for the sum of one thousand dollars, as required by section 25 of the Dominion Lands Surveys Act.

Thirty-one certificates of preliminary examination were issued to successful candidates who had complied with the requirements of the law.

Section 35 of the Dominion Lands Surveys Act provides that every Dominion land surveyor shall be in possession of a subsidiary standard of length. Fifteen new standards were issued to surveyors during the year. A list of Dominion land surveyors who are in possession of standard measures will be found in Appendix No. 9. A communication was received from the secretary of the Ontario Land Surveyors' Association pointing out that the O.L.S. standard measure was in every way similar to the D.L.S. standard, and asking that any Ontario land surveyor who becomes a Dominion land surveyor should not be required to procure a new standard. He was informed that there was no objection to his request, provided the standard was in good condition and was tested under the supervision of the Surveyor General at Ottawa.

Mr. F. D. Henderson, who had been secretary of the board since 1906, resigned his office during the year, and Mr. J. Aurele Cote, of the Topographical Surveys Branch, Interior Department, was appointed to the position in July, 1914.

The correspondence of the board was as follows: Letters received, 1,621; letters sent, 914; circular letters, pamphlets and parcels sent, 1,547.

APPENDICES.

No. 1. Schedule of surveyors employed and work executed by them.

No. 2. Schedule showing for each surveyor employed the number of miles surveyed, of township section line, township outline, traverses of lakes and rivers, and resurvey; also the cost of the same.

No. 3. Surveys in the Yukon territory returns of which have been received during the year.

No. 4. Details of the office work.

No. 5. Sectional maps of which new editions have been issued.

No. 6. Work executed in the photographic office.

No. 7. Work executed in the lithographic office.

No. 8. Office staff of the Topographical Surveys Branch at Ottawa, as on April 1, 1915, with the name, classification, duties of office, and salary of each.

No. 9. List of Dominion Land Surveyors who are in possession of standard measures.

Nos. 10 to 61. Abstracts of reports of surveyors employed.

No. 62. Results of magnetic observations.

No. 63. Results of watch trials.

No. 64. List of surveying instruments on hand on March 31, 1915.

MAPS AND PROFILES.

The following maps and profiles accompany this report:—

Map showing surveys to March 31, 1915.

Maps to accompany reports of surveyors.

Profiles of meridians and base lines.

I have the honour to be, sir,

Your obedient servant,

E. DEVILLE,

Surveyor General.

TOPOGRAPHICAL SURVEYS BRANCH

SCHEDULES AND STATEMENTS

APPENDIX No. 1.

SCHEDULE of Surveyors employed and work executed by them from April 1, 1914, to March 31, 1915.

Surveyor.	Address.	Description of Work.
Akins, J. R.	Ottawa, Ont.	Survey of the 29th base line across ranges 2 to 24, west of the Fifth meridian.
Aylsworth, C. F.	Madoc, Ont.	Resurvey in tp. 22-3-Pr., tp. 23-5-Pr., tp. 12-10-E., and tp. 14-11-E. Traverse in tp. 20-4-Pr.
Baker, M. H.	Toronto, Ont.	Subdivision in tps. 12 and 16-1-4, tps. 14 and 15-5-4, tp. 17-6-4, tp. 21-8-4, tp. 20-9-4, and tp. 19-7-5. Retracement in tps. 14 and 15-5-4, tp. 20-9-4, tp. 5-14-4, and tp. 16-4-5. Resurvey in tp. 13-24-3, and tp. 9-12-4. Correction survey in tp. 23-29-3, and tp. 41-14-4. Traverse in tps. 1 and 20-4-4. Survey of lot in secs. 7 and 8, tp. 28-18-5. Restoration survey of the cemetery at Field. Traverse of roads from Field to Hector, from Field to Ottertail, from Field out the Yoho valley, and from Lake Louise station to Chateau Lake Louise. Posting of part of the townsite of Wymark. Retracement of coal claims along Sheep river in tp. 19-4-5. Survey of Moraine road in tps. 27 and 28-6-5.
Bélanger, P. R. A.	Ottawa, Ont.	Inspection of contracts Nos. 4, 6 and 19 of 1913, and Nos. 5, 6, 7, 8, 10, 11, 12 and 15 of 1914. Subdivision surveys in tp. 80-11-5 and tp. 80-12-5.
Bennett, G. A.	Tillsonburg, Ont.	Stadia surveys in tp. 36-14-3, tps. 35 and 36-15-3, tps. 35 and 36-16-3, tp. 35-17-3, tps. 31, 34 and 35-19-3, tps. 32 and 33-20-3, tps. 32, 34 and 36-21-3, tps. 31, 32, 33, 34, 35 and 36-22-3, tp. 34-23-3, tps. 27, 28, 29 and 30-24-3, tps. 27, 28, 29 and 30-25-3, tps. 27, 28, 29 and 30-26-3, tps. 27, 28, 29 and 30-27-3, tps. 26, 27, 28, 29 and 30-28-3, tps. 27, 28, 29 and 30-29-3, tps. 27 and 29-1-4, and tp. 28-3-4. Retracement surveys in tp. 32-14-4, tps. 31 and 32-15-4, tp. 34-16-4, tps. 34 and 37-17-4, tps. 35 and 36-18-4, tp. 35-27-4, tps. 34 and 35-28-4, and tp. 34-29-4. Correction surveys in tp. 38-18-4, tp. 38-19-4, tp. 37-25-4, and tps. 41 and 42-28-4. Traverse in tp. 55-24-4.
Blanchet, G. H.	Ottawa, Ont.	Survey of the 24th base line across ranges 12 to 25, and the 25th base line across ranges 13 to 25, west of the Fourth meridian. Retracement of the 24th base line across part of range 11, and the 25th base line across part of range 12, west of the Fourth meridian.
Boivin, E.	Chicoutimi, Que.	Contract No. 16 of 1914. Subdivision of tps. 78, 79, 80, 81 and 82-17-4, and the north third of tp. 77-17-4.

SCHEDULE of Surveyors employed and work executed by them from April 1, 1914, to March 31, 1915—*Continued.*

Surveyor.	Address.	Description of Work.
Boulton, W. J.	Wallaceburg, Ont.	Stadia surveys in tps. 7, 8, 9 and 10-15-4, tps. 7, 8, 9, 10, 11 and 12-16-4, tps. 7, 8, 9, 10, 11 and 12-17-4, tps. 7, 8, 9, 10 and 11-18-4, tps. 7, 8, 9 and 10-19-4, and tps. 8 and 9-20-4.
Bowman, E. P.	West Montrose, Ont.	Stadia surveys in tps. 7, 8, 9 and 10-15-4, tps. tps. 37, 38, 39, 40 and 41-14-3, tps. 37, 38, 39, 40 and 41-15-3, tps 36, 37, 38, 39 and 40-16-3, tps. 36, 37, 38, 39, 40 and 41-17-3, tps. 37, 38, 39, 40 and 41-18-3, tps. 51 and 52-21-3, tps. 51, 52 and 53-22-3, tps. 52 and 53-23-3, tps. 52 and 53-24-3, and tp. 52-25-3.
Brenot, L.	Ottawa, Ont.	Survey of the east outlines of tps. 81, 83 and 84-24-6, and tps. 80, 83, and 84-25-6. Subdivision in tp. 83-17-6, tps. 82 and 83-18-6, and tps. 79, 80 and 82-24-6. Traverse in tp. 83-21-6, and tp. 81-25-6. Resurvey of Hudson's Bay Company's posts at Fort St. John and Hudson Hope.
Bridgland, M. P.	Calgary, Alta.	Photo-topographical survey of the southern part of the Crowsnest Forest Reserve. Retracement of the triangulation of the Rocky and Selkirk mountains.
Brownlee, J. H.	Vancouver, B.C.	Survey of road from sec. 32, tp. 17, E.C.M., to sec. 19, tp. 18, E.C.M.
Buchanan, J. A.	Edmonton, Alta.	Contract No. 13 of 1914. Subdivision of tps. 85, 86 and 87-21-5, and tps. 85, 86, 87 and 88-22-5.
Calder, J. A.	Lytton, B.C.	Subdivision in tps. 22 and 23-20-6, tp. 22-21-6, tps. 17, 18, 19 and 20-24-6, tps. 17 and 18-25-6, tps. 15, 16 and 17-26-6, and tp. 17-27-6. Traverse in tp. 23-20-6, tp. 22-21-6, tps. 18 and 19-24-6, tps. 17 and 18-25-6, and tps. 15 and 17-26-6.
Christie, W.	Prince Albert, Sask.	Subdivision of tp. 71-20-4, tps. 70 and 71-21-4, and tps. 70 and 71-22-4; part subdivision of tp. 70-20-4, and tp. 72-22-4. Survey of east outline of tp. 72-21-4.
Coltham, G. W.	Aurora, Ont.	Stadia surveys in tps. 43, 45, 46 and 47-8-4, tps. 42, 43, 44, 45, 46 and 47-9-4, tps. 42, 43, 44, 45, 46, 47 and 48-10-4, tps. 42, 43, 44, 45, 46, 47 and 48-11-4, tps. 43, 44, 45, 46, 47 and 48-12-4, tps. 43, 44, 45 and 46-13-4, and tps. 43, 44, 45, 46 and 47-14-4.
Coté, J. M.	Ottawa, Ont.	Subdivision in tp. 4-7-4, tps. 3 and 4-8-4, and tp. 3-9-4. Resurvey in tp. 51-23-3, tp. 51-24-3, tp. 22-10-4, tp. 21-11-4, tps. 21 and 22-12-4, and tp. 54-19-4. Correction survey in tp. 38-28-4, and 38-1-5. Retracement survey in tp. 20-1-4, and tp. 20-2-4.
Cowper, G. C.	Welland, Ont.	Stadia surveys in tps. 11, 12, 13 and 14-8-3, tps. 11, 12, 13 and 14-9-3, tps. 11, 12, 13 and 14-10-3, tps. 11, 12, 13, 14 and 15-11-3, tps. 11, 12, 13 and 14-12-3, tps. 11, 12, 13, 14, 15 and 16-13-3, tps. 11, 12, 13, 14, 15 and 16-14-3, tps. 11, 12, 13 and 14-15-3, tps. 10, 11 and 14-16-3, tps. 11, 12 and 13-17-3, tps. 9, 11, 12, 13, 14, 19 and 22-18-3, tps. 11, 12, 13, 14, 22 and 23-19-3, tps. 7, 8, 9, 10, 11, 12, 13 and 23-20-3, tp. 11-21-3, tp. 11-22-3, tp. 11-23-3, tp. 11-24-3, tps. 11, 12 and 17-25-3, tps. 11, 12 and 17-26-3, tps. 11, 12, 13, 14, 15, 16 and 17-27-3, tps. 11, 12, 13, 14, 15, 16 and 17-28-3, tps. 11, 12, 13, 14, 15, 16, 17 and 18-29-3, tps. 11, 12, 13, 14, 15, 16 and 17-30-3, and tps. 13 and 14-1-4.

SESSIONAL PAPER No. 25b

SCHEDULE of Surveyors employed and work executed by them from April 1, 1914, to March 31, 1915—*Continued.*

Surveyor.	Address.	Description of Work.
Cumming, A. L.	Cornwall, Ont.	Subdivision of tp. 82-21-5 and tp. 82-22-5. Partial subdivision of tp 84-20-5, tp. 83-21-5, tp. 83-22-5, and tp. 82-23-5. Traverse in tp. 70-27-4, tp. 72-2-5, tp. 72-3-5, tps. 72 and 73-9-5, and tp. 73-10-5. Retracement in tp. 73-6-5, tp. 84-21-5, tp. 84-22-5, and of lot 21, group 1, in tp. 72-2-5. Resurvey of road through lots 1 and 2 of Athabaska settlement.
Davies, T. A.	Edmonton, Alta.	Contract No. 10 of 1914. Subdivision of tp. 81-21-5, tp. 81-22-5, tp. 81-23-5, tps. 78, 79 and 80-24-5, and the west half of tp. 81-20-5.
Day, H. S.	Edmonton, Alta.	Contract No. 17 of 1914. Subdivision of tp. 83-16-4, and tps. 83, 84, 85 and 86-17-4. Survey of the east outlines of tps. 81, 82 and 84-16-4, tps. 81 and 82-17-4, and tps. 81 and 82-18-4.
Deans, W. J.	Brandon, Man.	Inspection of contracts Nos. 13 and 26 of 1912. Nos. 21, 24, 25, 26, 27 and 28 of 1913, and Nos. 20 and 21 of 1914. Partial inspection of contract No. 13 of 1911. Subdivision of summer resort at Madge Lake in tp. 30-30-Pr., of lots in tp. 15-5-Pr., and in tps. 32 and 33-13-Pr. Survey of part of Grand Rapids settlement. Inspection of work done by R. J. Jephson in 1912.
Evans, S. L.	Corinth, Ont.	Subdivision survey in tp. 24-8-3 and tp. 24-9-3. Resurvey in tp. 39-13-3, tp. 16-21-3, and tp. 23-23-3. Retracement survey in tps. 24 and 26-8-3, tps. 24, 25 and 26-9-3, and tp. 26-10-3. Subdivision of lots at Clear Lake in tp. 19-19-Pr. Topographical survey of site for summer resort at Madge Lake in tp 30-30-Pr.
Fawcett, S. D.	Ottawa, Ont.	Settlement surveys at Pelican, Hay River and Fort Providence. Surveys of additions to settlements at Fort Resolution and Fort Simpson
Fletcher, J. A.	Ottawa, Ont.	Survey of the 26th base across ranges 1 to 17, west of the Fifth meridian, and of the 27th base across ranges 1 to 9, west of the Fifth meridian.
Fletcher, W. A.	Thornton, Ont.	Stadia surveys in tp. 26-10-2, tps. 25, 26 and 27-11-2, tps. 25, 26 and 27-12-2, tps. 24, 25, 26, 27, 27a and 28-13-2, tp. 27a-13a-2, tps. 25, 26, 27 and 27a-14-2, and tp. 27a-15-2.
Fontaine, L. E.	Lévis, Que.	Inspection of contracts Nos. 2, 9, 13, 14, 16, 17, 18 and 19 of 1914. Subdivision in tp. 77-24-5. Retracement survey in tps. 70 and 78-5-6, tps. 72 and 78-6-6, tp. 71-7-6, and tp. 72-8-6. Traverse in tp. 77-24-5, tps. 71 and 72-7-6, tp. 72-8-6, tp. 71-10-6, and tp. 70-11-6.
Francis, John.	Portage la Prairie, Man.	Contract No. 20 of 1914. Subdivision of tps. 34 and 35-8-Pr., and tps. 34, 35 and 36-9-Pr.
Galletly, J. S.	Oshawa, Ont.	Subdivision in tp. 64-14-Pr., tps. 63 and 64-15-Pr., tps. 63 and 64-16-Pr., tp. 62-18-Pr., tps. 61 and 62-19-Pr., tp. 61-24-Pr., and tp. 56-27-Pr. Survey of east outlines of tp. 64-17-Pr., and tps. 61, 63 and 64-18-Pr. Traverse in tp. 63-18-Pr., tp. 56-26-Pr., and tp. 56-27-Pr. Survey of lot in tp. 65-26-Pr. Mounding in tps. 57 and 58-26-Pr.
Gibbon, Jas.	Vancouver, B.C.	Subdivision in tp. 7-23-6, tps. 6 and 7-24-6, and tps. 5 and 6-25-6. Traverse in tp. 7-23-6, tps. 6 and 7-24-6, and tps. 5 and 6-25-6.
Glover, A. E.	Beaverton, Ont.	Contract No. 5 of 1914. Subdivision of tps. 71, 72 and 73-25-5, and tps. 70, 71, 72 and 73-26-5. Survey of the east outline of tp. 69-27-5.
Green, T. D.	Ottawa, Ont.	Subdivision of tp. 36-8-5, tp. 40-10-5, and part of tp. 35-8-5.

SCHEDULE of Surveyors employed and work executed by them from April 1, 1914, to March 31, 1915—*Continued.*

Surveyor.	Address.	Description of Work.
Griffin, A. D.	Elk Lake, Ont.	Contract No. 19 of 1914. Subdivision of tp. 91-9-4, tps. 92 and 93-10-4, tp. 88-11-4, tp. 88-12-4, and parts of tp. 90-9-4 and tp. 91-10-4. Survey of the east outline of tp. 92-9-4.
Hawkins, A. H.	Listowel, Ont.	Survey of the Principal meridian from the 21st to the 23rd base line and the 22nd base line across range 1, west of the Principal meridian, and range 1, east of the Principal meridian. Retracement of the Second meridian from the NE corner tp. 56-1-2 to NE. corner sec. 12, tp. 85-1-2, and of the 15th base line across ranges 1 to 21, west of the Second meridian.
Heathcott, R. V.	Edmonton, Alta.	Contract No. 12 of 1914. Subdvision of tps. 78 and 79-14-5, tps. 78 and 79-15-5, tps. 78 and 79-16-5, the north third of tp. 77-14-5, and the north two-thirds of tp. 77-15-5. Survey of the east outlines of tps. 80-14-5, tp. 80-15-5, and tp. 80-16-5.
Herriot, G. H.	Ottawa, Ont.	Survey of the 19th base line across ranges 1 to 5, the 21st base line across ranges 12 to 20, and the 22nd base line across ranges 21 and 22, east of the Principal meridian. Survey of the Second meridian east, from the 22nd to the 23rd base line, the 23rd base line across ranges 1 to 11, and the 24th base line across range 11, east of the Second meridian east. Survey of the east outline of tps. 81, 82, 83 and 84-20-E., and tps. 89, 90, 91 and 92-11, E. 2 E.
Holcroft, H. S.	Toronto, Ont.	Subdivision of lots at Fort Churchill. Retracement of Hudson's Bay Company's reserve and Royal Northwest Mounted Police reserve at Fort Churchill.
Jackson, J. E.	Hamilton, Ont.	Contract No. 21 of 1914. Subdivision of tps. 27 and 28-3-E., tps. 25, 26 and 27-5-E., and tps. 26 and 27-6-E.
Johnston, J. H.	Edmonton, Alta.	Contract No. 14 of 1914. Subdivision of tps. 85, 86, 87, 88 and 89-20-5, and tps. 88 and 89-21-5.
Johnston, W. J.	St. Catharines, Ont.	Subdivision in tps. 22 and 23-1-6, tps. 22 and 23-2-6, tps. 19 and 20-5-6, tps. 18, 19, 22 and 23-6-6, tp. 22-7-6, tp. 21-12-6, and tp. 21-13-6. Traverse in tps. 22 and 23-1-6, tps. 22 and 23-2-6, tp. 19-5-6, tps. 18 and 19-6-6, tp. 23-10-6, tps. 20, 21 and 22-12-6, and tp. 21-13-6. Stadia surveys in tps. 20 and 21-29-5 and tp. 21-1-6.
LeBlanc, P. M. H.	Ottawa, Ont.	Subdivision of tp. 107-14-5, tp. 106-15-5, and tp. 108-17-5. Partial subdivision of tp. 108-5-5, tps. 108 and 109-11-5, tps. 108 and 109-12-5, tp. 109-13-5, tp. 104-14-5, tps. 107 and 108-15-5, tp. 108-16-5, and tp. 108-18-5. Survey of the east outlines of tps. 105 and 106-14-5, tp. 105-15-5, tp. 105-16-5.
Lonergan, G. J.	Buckingham, Que.	Inspection of work performed by daily-paid surveyors in Manitoba, Saskatchewan, Alberta, and British Columbia.
MacLeod, G. W.	Edmonton, Alta.	Contract No. 2 of 1914. Subdivision of tp. 75-10-6, tp. 69-11-6, tps. 69, 70, 71 and 72-12-6, tps. 78 and 79-16-6, and the north two-thirds of tp. 74-10-6. Survey of the east outlines of tps. 77 and 80-17-6.
Martyn, O. W.	Regina, Sask.	Survey of the townsite of Wymark, Sask., in tp. 13-13-3.

SESSIONAL PAPER No. 25b

SCHEDULE of Surveyors employed and work executed by them from April 1, 1914, to March 31, 1915—*Continued.*

Surveyor.	Address.	Description of Work.
Matheson, H.	Ottawa, Ont.	Topographical survey near Jasper, in the valleys of Athabaska and Miette rivers. Survey of the corral near Jasper. Posting of a portion of the townsite of Jasper. Survey of coal lease in tp. 49-26-5.
Melhuish, P.	Vancouver, B.C.	Subdivision in tp. 3-28-6, tp. 4-29-6, tp. 3-30-6, tp. 5-4-7, tp. 24, E.C.M. and tp. 39, W.C.M. Traverse in tp. 3-28-6, tp. 4-29-6, tp. 3-30-6, tp. 5-4-7, tp. 24, E.C.M., and tp. 39, W.C.M. Survey of addition to the townsite of Woodhaven.
McKay, R. B.	Vancouver, B.C.	Latitude observations on the Fourth meridian, the Fifth meridian and the Sixth meridian, in northern Alberta.
McKnight, J. H.	Simcoe, Ont.	Stadia surveys in tp. 48-10-2, tps. 31, 32 and 33-12-2 tps. 32 and 33-13-2, tps. 35, 36 and 38-14-2, tps. 35, 36, 37 and 38-15-2, tps. 31, 36, 37 and 38-16-2, tps. 34, 35, 36, 37 and 38-17-2, tps.33, 35, 36, 37 and 38-18-2, and tps. 33, 34, 35, 36, 37 and 38-19-2.
McMaster, W. A. A.	Prince Albert, Sask.	Resurvey in tp. 46-25-2. Retracement in tp. 47-26-2, tps. 47 and 48-27-2, and tp. 47-28-2. Resurvey of part of Prince Albert settlement. Subdivision in tp. 51-1-3.
Narraway, A. M.	Ottawa, Ont.	Survey of the 6th base line across range 10 and part of range 11, the 12th base line across ranges 2 and 3, and the 13th base line across part of range 1, west of the Principal meridian, and ranges 1, 2 and part of range 3, east of the Principal meridian. Survey of the east outlines of tps. 45, 46, 47 and 48-1-E., and of tps. 38, 39, 40, 41, 42, 43 and 44-3-E.
Neelands, R.	Hamiota, Man.	Stadia surveys in tp. 44-21-2, tp. 44-22-2, tps. 38, 39, 40, 41 and 42-25-2, tps. 38, 39, 40, 41 and 42-26-2, tps. 38, 39, 40, 41, 42, 43, 44, 45 and 45a-28-2, tps. 41, 42, 42a, 43 and 44-1-3, and tps. 52 and 53-7-3.
Norrish, W. H. (This work was originally allotted to Mr. A. E. Hunter, but on his decease it was continued by Mr. Norrish.)	Guelph, Ont.	Subdivision in tps. 13, 14 and 15-23-6, tp. 16-24-6, and tps. 11, 12 and 13-26-6. Traverse in tps. 14 and 15-23-6, tp. 16-24-6, tps. 11, 12 and 13-26-6, and tp. 13-27-6.
Palmer, P. E.	Dorchester, N.B.	Subdivision in tps. 69 and 70-7-Pr., tps. 68 and 69-8-Pr., tps. 67 and 68-9-Pr., tps. 65, 66 and 67-10-Pr., tps. 65 and 66-11-Pr., tp. 65-12-Pr., and tps. 64 and 65-13-Pr. Survey of island in Saskatchewan river in tp. 56-26-Pr.
Pearson, H. E.	Edmonton, Alta.	Contract No. 15 of 1914. Subdivision of tps. 79, 80 and 81-25-4, tps. 79, 80 and 81-26-4, and tps. 79, 80 and 81-1-5. Survey of the east outlines of tps. 77 and 78-25-4, tps. 77 and 78-26-4, and tps. 77 and 78-2-5.
Pierce, J. W.	Ottawa, Ont.	Contract No. 18 of 1914. Subdivision of tp. 87-16-4, tp. 87-17-4, the north two-thirds of tp. 87-12-4, tp. 87-13-4, tp. 87-14-4, and tp. 87-15-4, and the south third of tp. 88-13-4, tp. 88-14-4, tp. 88-15-4, and tp. 88-16-4. Survey of the east outlines of tps. 85 and 86-16-4, tps. 85 and 86-17-4, and tp. 88-18-4.
Pinder, G. Z.	Edmonton, Alta.	Contract No. 11 of 1914. Subdivision of tp. 79-18-5, tp. 79-19-5, tps. 79 and 80-20-5, tps. 79 and 80-21-5, and part of tp. 80-19-5. Survey of the east outlines of tp. 78-19-5, and tp. 78-20-5.
Ponton, A. W.	Edmonton, Alta.	Contract No. 6 of 1914. Subdivision of tp. 73-21-5, tps. 73 and 74-22-5, tps. 73 and 74-23-5, tp. 73-24-5, and the south two-thirds of tp. 75-22-5, and tp. 75-23-5.

SCHEDULE of Surveyors employed and work executed by them from April 1, 1914, to March 31, 1915—*Continued.*

Surveyor.	Address.	Description of Work.
Purser, R. C.	Windsor, Ont.	Subdivision in tps. 29 and 30-13-3, tps. 23, 24 and 25-15-3, and tp. 24-16-3. Retracement in tps. 14 and 15-1-Pr., tps. 14 and 15-2-Pr., tp. 15-3-Pr., tp. 9-27-Pr., tp. 21-31-Pr., tp. 23-19-2, tps. 3 and 7-20-2, tps. 5 and 7-21-2, tps. 7 and 25-22-2, tp. 6-25-2, tps. 25 and 26-27-2, tp. 20-1-3, tp. 21-9-3, tp. 39-12-3, and tp. 48-20-3. Correction survey in tp. 25-17-2, tp. 40-18-2, tp. 4-29-2, tp. 4-30-2, tp. 14-3-3, tp. 39-13-3, tp. 19-15-3, and tps. 36 and 37-20-3. Investigation in tp. 12-31-Pr.
Rinfret, C.	Montreal, Que.	Stada surveys in tps. 3, 4, 5, 6, 8, 9 and 10-19-2, tps. 9 and 10-20-2, tps. 8, 9 and 10-21-2, tps. 8 and 9-22-2, tps. 8 and 9-23-2, tp. 8-24-2, tps. 8 and 9-25-2, tps. 7, 8, 12 and 13-26-2, tps. 7, 8, 12 and 13-27-2, tps. 7, 12 and 13-28-2, tp. 7-29-2, tps. 7 and 8-30-2, tps. 5, 6 and 7-1-3, tps. 5, 6 and 7-2-3, and tps. 5 and 6-3-3.
Roberts, O. B.	Murray Harbour, P.E.I.	Stadia surveys in tps. 42 and 43-2-4, tp. 42-3-4, tps. 39, 41 and 42-5-4, tps. 38, 39, 40, 41 and 42-6-4, tp. 30-7-4, tps. 39 and 41-8-4, tps. 35, 36, 38, 39, 40, 41 and 42-9-4, tps. 35, 38, 39, 40, 41 and 42-10-4, tps. 39, 40, 41 and 42-11-4, tps. 39, 40, 41 and 42-12-4, tps. 40, 41 and 42-13-4, tps. 37, 38, 40, 41 and 42-14-4, tps. 37, 38, 40, 41 and 42--15-4, tps. 37, 38, 41 and 42-16-4, tps. 37, 38, 39 and 42-17-4, tps. 35, 36, 38 and 39-19-4, and tp. 39-20-4.
Segre, B. H.	Toronto, Ont.	Stadia surveys in tp. 20-22-2, tps. 19 and 20-23-2, tps. 19 and 20-24-2, tps. 17, 18, 19 and 20-25-2, tps. 17, 18, 19 and 20-26-2, tps. 17, 18, 19 and 20-27-2, tps. 17, 18, 19 and 20-28-2, tps. 17, 18, 19, 20 and 24-29-2, tps. 17 and 18-30-2, tps. 17, 18, 19, 20, 23, 24 and 28-1-3, tps. 20, 23 and 24-2-3, tps. 20, 22 and 23-3-3, tps. 19, 20, 21, 22 and 23-4-3, tps. 20, 21 and 22-5-3, tps. 21 and 22-6-3, tps. 19, 20, 21 and 22-7-3, and tps. 21 and 22-8-3.
Silbert, F. V.	Edmonton, Alta.	Survey of the 26th base line from the Fourth to the Fifth meridian.
Soars, H. M. R.	Edmonton, Alta.	Stadia surveys in tp. 60-12-4, tps. 51, 52 and 53-16-4, tps. 50, 51, 52, 53, 54 and 54-17-4, tps. 50, 51, 52, 53, 54 and 58-18-4, tps. 51, 52, 53, 54 and 57-19-4, tps. 51, 52 and 53-20-4, tps. 49, 50, 51 and 52-21-4, tps. 49, 50, 51 and 52-22-4, and tps. 48, 51, 52 and 53-23-4.
Stewart, N. C.	Ottawa, Ont.	Subdivision in tp. 23-18-5, tps. 23 and 24-19-5, tps. 24 and 25-20-5, tps. 25 and 26-21-5, and tp. 26-22-5. Traverse in tps. 23 and 24-18-5, tps. 23 and 24-19-5, tps. 24 and 25-20-5, tps. 24, 25, 26 and 27-21-5, and tps. 26 and 27-22-5. Resurvey of lot 11, block 2, in the town of Golden in tp. 27-22-5.
Stock, J. J.	Ottawa, Ont.	Contract No. 8 of 1914. Subdivision of tps. 77 and 78-18-5, tps. 75, 76 and 78-19-5, tp. 78-20-5, and the south two-thirds of tp. 75-20-5.
Street, P. B.	Toronto, Ont.	Subdivision of tp. 70-6-Pr., and partial subdivision of tps. 70 and 71-5-Pr. Survey of the east outlines of tps. 69 and 72-5-Pr., tp. 69-6-Pr., and tp. 69-7-Pr.
Stuart, A. G.	Buckingham, Que.	Survey of the 2nd base line from the Second to the Fourth meridian, the Fourth meridian from the first base line to the north boundary of township 53 and the north boundaries of tp. 48-28-3, tps. 12, 16, 20, 24, 28 and 32-29-3, tps. 12 and 16-30-3, and tps. 12, 16, 20, 24, 28, 32 and 48-1-4. Retracement for bearings of tp. 23-12-Pr., tps. 23, 31, 32 and 33-13-Pr., and part of tp. 30-13-Pr.

SCHEDULE of Surveyors employed and work executed by them from April 1, 1914, to March 31, 1915—*Concluded.*

Surveyor.	Address.	Description of Work.
Taggart, C. H.	Kamloops, B.C.	Subdivision in tp. 20-14-6, tp. 22-16-6, tp. 23-17-6, tp. 23-18-6, tp. 24-19-6, tp. 24-20-6, tps. 21, 23 and 24-21-6, tp. 24-22-6, tp. 24-23-6, tp. 24-24-6, tps. 23 and 24-25-6, and tp. 23-26-6. Traverse in tp. 22-16-6, tp. 23-17-6, and tp. 20-18-6.
Tipper, G. A.	Brantford, Ont.	Contract No. 9 of 1914. Subdivision of tps. 77, 78, 79 and 80-25-5, and tps. 77, 78, 79 and 80-26-5.
Waddell, W. H.	Edmonton, Alta.	Contract No. 7 of 1914. Subdivision of tp. 73-18-5, tps. 73 and 74-19-5, tps. 73 and 74-20-5, tp. 74-21-5, and the south two-thirds of tp. 75-21-5. Survey of the east outline of tp. 73-22-5, and part of the east outline of tp. 75-20-5.
Walker, C. M.	Guelph, Ont.	Resurvey of Canmore townsite, blocks 1 and 2 of Banff townsite, and the north boundary section 32, tp. 24-10-5. Survey of Bankhead cemetery and additions to the townsite and villa lot section of Banff. Contour survey of the southwest slope of Tunnel mountain. Traverse and levels of roads in the vicinity of Banff, and levels and local improvements in the villa lot section of Banff. Supervision of the survey of roads in the Rocky Mountains park and Yoho park.
Wallace, J. N.	Calgary, Alta.	Precise levelling along the Canadian Northern railway from Winnipeg to Swan river, from Portage la Prairie to Lake Manitoba, from Ochre river to Lake Dauphin, from Sifton Junction to Lake Winnipegosis, from Prince Albert to Big river, and from Pas towards Port Nelson, a distance of ninety-nine miles from Pas.
Waugh, B. W.	Ottawa, Ont.	Survey of the 21st base line across ranges 10 and 11, the 22nd base line across ranges 12 to 20, and the 23rd base line across ranges 21 and 22, all east of the Principal meridian. Survey of the Second meridian east from the 23rd to the 24th base line, and the 24th base line across ranges 1 to 10, east of the Second meridian east. Survey of the east outlines of tps. 81, 82, 83 and 84-11-E., and tps. 85, 86, 87 and 88-20-E.

APPENDIX No. 2.

SCHEDULE showing for each surveyor employed, the number of miles surveyed of township section lines, township outlines, traverses of lakes and rivers, and resurvey; also the cost of the same.

Surveyor.	Miles of section.	Miles of outline.	Miles of traverse.	Miles of resurvey.	Total mileage.	Total cost.	Cost per mile.	Day work or contract.
						$	$ cts.	
Akins, J. R.		136			136	20,871	153 46	Day.
Aylsworth, C. F			26	130	156	9,292	59 56	Day.
Bennett, G. A	10		110	151	271	5,435	20 06	Day.
Blanchet, G. H.		158		2	160	22,812	142 58	Day.
Boivin, E	226	78	89		393	11,533	29 35	Contract.
Boulton, W. J.			269	2	271	5,405	19 95	Day.
Bowman, E. P.			172	97	269	4,766	17 72	Day.
Brenot, L.	54	89	44	3	190	12,032	63 33	Day.
Buchanan, J. A.	294	78	67		439	13,274	30 24	Contract.
Calder, J. A	122		51		173	9,276	53 62	Day.
Christie, W.	316	79	32		427	13,860	32 45	Day.
Coltham, G. W.			230		230	4,244	18 45	Day.
Cote, J. M.	20		75	330	425	11,863	27 91	Day.
Cowper, G. C.	4		189	41	234	4,925	21 04	Day.
Cumming, A. L.	142	33	121	21	317	15,661	49 40	Day.
Davies, T. A.	270	54	43		367	11,634	31 70	Contract.
Day, H. S.	213	120	90		423	12,583	29 75	Contract.
Evans, S. L.	13	2	32	232	279	9,968	35 73	Day.
Fletcher, J. A.		157			157	25,276	160 99	Day.
Fletcher, W. A.			320	8	328	4,033	12 30	Day.
Francis, J.	210	72	20		302	8,746	28 96	Contract.
Galletly, J. S.	198	88	77		363	12,805	35 28	Day.
Gibbon, J.	48		55		103	10,803	104 88	Day.
Glover, A. E.	294	72	8	6	380	12,511	32 92	Contract.
Green, T. D.	111	28	19		158	9,743	61 66	Day.
Griffin, A. D.	252	113	89		454	13,331	29 36	Contract.
Hawkins, A. H.		60		296	356	38,722	103 15	Day.
Heathcott, R. V.	291	124	77		492	14,773	30 03	Contract.
Herriot, G. H.		240			240	37,000	154 17	Day.
Jackson, J. E	199	57	82		338	8,966	26 53	Contract
Johnston, J. H.	293	90	127		510	14,416	28 27	Contract
Johnston, W. J.	127		121		248	9,709	39 15	Day
Le Blanc, P. M. H.	309	97	38		444	28,834	64 94	Day
Macleod, G. W.	363	114	52		529	15,636	29 56	Contract
Melhuish, P.	42		54		96	9,086	94 65	Day
McKnight, J. H.			209		209	4,231	20 24	Day
McMaster, W. A. A.			14	76	90	4,400	48 88	Day
Narraway, A. M		99		1	100	14,176	141 76	Day
Neelands, R.			472		472	5,094	10 79	Day
Norrish, W. H.	60		59		119	9,053	76 07	Day
Palmer, P. E.	223	83	87		393	11,008	28 01	Day
Pearson, H. E.	303	138	118		559	15,181	27 16	Contract
Pierce, J. W.	276	130	102		508	15,329	30 17	Contract
Pinder, G. Z.	285	68	15		368	11,751	31 93	Contract
Ponton, A. W.	304	74	6		384	12,415	32 33	Contract
Purser, R. C.	17			89	106	5,568	52 53	Day
Rinfret, C			283	81	364	4,471	12 29	Day
Roberts, O. B			177	204	381	8,138	21 36	Day
Segre, B. H.			46	34	80	4,585	57 31	Day
Seibert, F. V		146		1	147	25,260	171 84	Day
Soars, H. M. R.			258		258	4,710	18 21	Day
Stewart, N. C.	90		305		395	9,339	23 65	Day
Stock, J. J.	260	42	34		336	9,964	29 66	Contract
Street, P. B	71	53	30		154	8,378	54 40	Day
Stuart, A. G.				739	739	8,327	13 13	Day
Taggart, C. H	111		12		123	10,582	86 03	Day
Tipper, G. A.	401		38		439	13,974	31 83	Contract
Waddell, W. H.	278	90	97		465	13,286	28 57	Contract
Waugh, B. W.		208			208	31,209	150 04	Day
	7,100	3,270	5,141	2,544	18,055	734,253		

APPENDIX No. 3.

SURVEYS in the Yukon Territory, returns of which have been received during the year,

LOT SURVEYS.

GROUP No. 5.

Lot Number.	Acres.	Surveyor.	Year of Survey.	Date of Approval.	Claimant.	Remarks.
147	48·69	H. G. Dickson..	1913	July 4, 1914	Hamilton Yukon Mining Co.	"Canyon" mineral claim.
184	30·57	" ..	1913	" 4, 1914	" " " .	"Palace" "
199	50·56	" ..	1913	" 4, 1914	" " " .	"Wentworth" "
200	51·26	" ..	1913	" 6, 1914	F. J. Nicholson.....	"Brown Cub" "
224	43·19	" ..	1913	" 6, 1914	Henry Baxter.....	"Black Cub" "
227	51·54	" ..	1913	Jan 18, 1915	D. C. Campbell.....	"Wonder" "

GROUP No. 6.

54	49·03	H. G. Dickson..	1913	July 6, 1914	Donald Ross, *et al.*	"Acme" mineral claim.
108	50·51	" ..	1913	" 6, 1914	" "	"Acme" No. 2 "
124	29·44	" ..	1913	" 6, 1914	" "	"Alice" "
125	27·08	" ..	1913	" 6, 1914	" "	"Ross" "
126	51·65	" ..	1913	" 6, 1914	" "	"Comstock" No. 2 "
127	46·93	" .	1913	" 6, 1914	" "	"Comstock" "
128	26·76	" ..	1913	" 6, 1914	" "	"Silver King" "
129	51·61	" ..	1913	" 6, 1914	" "	"Silver King" No. 2 "
130	39·43	" ..	1914	..... .	Howard Cochrane, *et al.*.....	"Rip" "
131	39·43	" ..	1914	.....	" "	"Mavis" "
132	51·65	" ..	1914	....	" "	"Maid Marion" "
133	51·65	" ..	1914	..... .	" "	"Mountain Sheep" "
134	23·89	" ..	1914	.....	" "	"Ptarmigan" "
135	35·48	" ..	1914	....	" "	"Wheaton" "
136	48·16	" ..	1914	.....	" "	"Whirlwind" "
137	33·18	" ..	1914	....	" "	"Idelle" "

GROUP No. 10.

38	51·65	F. H. Kitto ..	1913	May 27, '14.	J. Paul Guite.....	"North Star" mineral claim.
39	44·36	"	1913	" 27, '14.	H. Boulais & J. O. Lachapelle	"Centre Star" "
40	41·88	"	1913	" 27, '14.	O. Vachon, *et al.*.....	"Alice" "
41	50·15	"	1913	" 27, '14.	L. A. Herdt	"Jeanette" "

GROUP No. 12.

6	138·75	F. H. Kitto....	1914	Dec. 9, '14.	C. L. Snell	Homestead.
8	18·4	"	1914	Nov. 20, '14.	J. E. Binet.....	Surface.
9	10·00	"	1914	Dec. 9, '14	C. L. Snell.....	"

GROUP No. 901.

Lot Number.	Acres.	Surveyor.	Year of Survey.	Date of Approval.	Claimant.	Remarks.
1	160·00	H. G. Dickson..	1913	....	Skolai Pass Mining Co ...	"Solomon Copper" mineral claim.
2	150·63	" ..	1913	.....	Solomon Albert..... . .	"Solomon" Extension No. 1 mineral claim.
3	157·90	" .	1913	....	J. R Slaggard..... .. .	"Solomon" Extension No. 2 mineral claim.
4	91·28	" ..	1913	.....	Mike Day.....	"King Midas Copper" mineral claim.
5	81·35	" ..	1913	Feb. 22, '15.	The N. A. T. & T. Co.	"Sunrise" mineral claim.
6	49·97	" ..	1913	.. ....	H. G. Blankman.....	"Golden Crown" "
7	41·34	" ..	1913	... .. .	"	"Homestake" "
8	36·51	" ..	1913	....	The Skolai Pass Mining Co..	"Lucky Hit" "
9	50·56	" ..	1913	....	" " .	"Nellie" "
10	51·65	" ..	1913	Mar. 8, '15.	The N. A. T. & T. Co.	"Silver Fox" "
11	51·65	" ..	1913	" 8, '15	" "	"Black Fox" "
12	51·65	" ..	1913	" 8, '15.	" "	"Beaver" "
13	51·65	" ..	1913	" 8, '15.	" "	"Eldorado" "
14	31·88	" ..	1913	.....	H. G. Blankman...	"Eastern Star" "
15	22·69	" ..	1913	Mar. 25, '15.	The N. A. T. & T. Co.	"Lost Treasure" "
17	160·00	" ..	1913	.....	Mike Day.....	"Rand" "
18	51·53	" ..	1913	....	"	"New Zealander" "
19	16·81	" ..	1913	.....	The Skolai Pass Mining Co..	"Copper Queen fraction' mineral claim.
20	33·87	" ..	1913	Mar. 25, '15.	The N. A. T. & T. Co	"Susie" mineral claim.
21	38·56	" ..	1913	.....	H. G. Blankman..... ..	"Reta" "
22	46·41	" ..	1913	.....	"	"Lyon" "
23	160·00	" ..	1913	.....	"	"Copper Queen" mineral claim.
24	124·04	" ..	1914	....	J. W. McLean.....	"Trust" mineral claim.

GROUP No. 1,054.

1	50·35	F. H. Kitto....	1912	Apr. 4, '15.	J. Stewart & Wm. Catto....	"Victoria" mineral claim.
2	47·90	"	1912	" 4, '15.	" "	"Dublin King" "
3	40·13	"	1912	" 4, '15.	" "	"Happy Jack" "
4	46·60	"	1912	" 4, '15.	" "	"Kootenay" "
5	46·39	" ..	1912	" 4, '15.	" "	"Foundation" "
6	5·67	"	1912	" 4, '15.	" "	"Shamrock" "
7	2·92	"	1912	" 4, '15	" "	"Victoria fraction" "
8	41·51	"	1912	" 4, '15.	S. C. McKim..... ...	"Aien Aristenein" "
9	5·1	" ...	1914	Nov. 20, '14.	J. E. Binet..	Surface
10	5·0	"	1914	" 20, '14.	Schogrin & Chasni.....	"

MISCELLANEOUS SURVEYS.

Year.	Surveyor.	Description of Survey.
1914..	F. H. Kitto.... .	Reference traverse between Bedrock creek and international boundary.
1913..	H. G. Dickson....	Continuation Aishihik Lake Reference traverse.
1913..	"	Reference traverse Bullion creek to Kluane lake.
1913..	"	Base Line on Fourth of July Creek.
1913..	"	Section "E" (Ore Spur) British Yukon Railway Co.
1913..	" ...	Whitehorse Kluane Government Road.
1914..	F. H. Kitto... ...	Base Lines on Sixty-mile creek and tributaries, California, Twelve-mile and Five-mile creeks.

APPENDIX No. 4.

DETAILS OF THE OFFICE WORK.

Letters and memoranda drafted	15,077
Letters of instruction to surveyors	321
Applications for various information dealt with	3,220
Sketches made	6,384
Maps and tracings made	282
Areas calculated	614
Pages of field notes copied	345
Descriptions written	30
Progress sketches received and filed	1,600
Declarations of settlers received and filed	229
Returns of timber berths received	7
Plans received from surveyors	1,111
Field books received from surveyors	889
Timber reports received	251
Observations for magnetic declination received	1,439
Plans of Yukon lots received	62
Plans of miscellaneous Yukon surveys received	7
Returns of surveys examined:—	
Township subdivision	842
Township outline	563
Road plans	541
Railway plans	85
Miscellaneous Yukon surveys	7
Yukon lots	62
Mineral claims	91
Timber berths	7
Correction and other miscellaneous surveys	217
Preliminary township plans prepared	382
Township plans compiled	905
Townsite settlement and other plans compiled	39
Proofs of plans examined	130
Township plans printed	704
Township plans reprinted	244
Townsite and settlement plans printed	13
Sectional maps (3 miles to 1 inch):—	
Revised and reprinted	15
Reprinted but not revised	8
New maps compiled and printed	14
Sectional maps (6 miles to 1 inch):—	
Reprinted	14
New maps printed	12
Files received and returned	1,968
Books received from Record Office and used in connection with office work	5,657
Books returned to Record Office	4,167
Plans other than printed township plans received from Record Office and used in connection with office work	1,046
Plans returned to Record Office	775
Volumes of plans received from Record Office and used in connection with office work	142
Volumes of plans returned to Record Office	75
Books sent to Record Office to be placed on record	780
Plans other than township plans sent to Record Office to be placed on record	180

APPENDIX No. 5.

SECTIONAL MAPS, of which new editions have been issued.

Scale, 3 miles to 1-inch.

No.	Name.	No.	Name.
20	Souris.	372	Minago.
66	Medicine Hat.	412	Wapiti.
113	Spillimacheen.	413	Iosegun.
114	Calgary.	414	Saulteux.
162	Seymour.	415	Tawatinaw.
172	Fairford.	416	La Biche.
173	Washow.	423	Sipiwesk.
213	Athabaska.	442	Wekusko.
263	Jasper.	462	Dunvegan.
314	St. Ann.	464	Giroux.
316	Vermilion.	465	Pelican.
317	Fort Pitt.	512	Montagneuse.
318	Shell River.	513	Heart River.
319	Prince Albert North.	515	Wabiskaw.
321	Cedar Lake.	563	Notikewin.
364	Fort Assiniboine.	566	McKay.
367	Meadow Lake.	663	Mustus.
368	Green Lake.	664	Mikkwa.
371	Cowan River.		

Scale, 6 miles to 1-inch.

20	Souris.	412	Wapiti.
113	Spillimacheen.	413	Iosegun.
173	Washow.	416	La Biche.
263	Jasper.	462	Dunvegan.
314	St. Ann.	464	Giroux.
316	Vermilion.	465	Pelican.
317	Fort Pitt.	512	Montagneuse.
318	Shell River.	513	Heart River.
319	Prince Albert North.	515	Wabiskaw.
321	Cedar Lake.	563	Notikewin.
367	Meadow Lake.	566	McKay.
368	Green Lake.	663	Mustus.
371	Cowan River.	664	Mikkwa.

APPENDIX No. 6.

Work executed in the Photographic Office.

—	3¼ x 3¼	3¼ x 5½	5 x 7	8 x 10	10 x 12	11 x 14	15 x 18	18 x 20	20 x 24	24 x 32	25 x 35	30 x 36	36 x 42	42 x 48	Total.
Dry plates and films		18	657			64									739
Bromide prints		15	4	87	43	1,938	284	105	59	63		15	41	65	2,719
Solio prints			139	51											190
Velox prints	50	218	5,547	1,030		101									6,946
Vandyke prints			47	6		15	24	49	44	167		47	34	45	478
Blue-prints			2	27	21	166	186	186	205	274		279	120	202	1,668
Lantern slides	23														23
Photographs mounted		6	2,194			26	75		1	12					2,314
Wet plate negatives				101		296	1,310	258	73	100					2,138
Photo-litho plates								105	11		6	475			597
	73	257	8,590	1,302	64	2,606	1,879	703	393	616	6	816	195	312	17,812

APPENDIX No. 7.

Work executed in the Lithographic Office.

	Maps.			Township Plans.			Forms.		
	No.	Copies.	Impressions.	No.	Copies.	Impressions.	No.	Copies.	Impressions.
1914.									
April	11	1,881	3,606	133	26,100	41,000	9	3,920	4,370
May	20	54,673	186,998	53	10,600	10,800	30	12,400	12,400
June	21	6,918	18,379	85	16,600	21,200	8	2,510	2,510
July	41	13,600	32,650	94	21,200	33,000	4	720	720
August	18	3,737	5,285	142	28,400	48,800	4	1,400	1,500
September	19	8,206	17,206	43	8,600	8,800	4	2,650	2,650
October	5	6,725	14,450	68	13,600	16,000	9	16,200	16,200
November	10	3,275	7,450	112	22,400	36,800	1	200	400
December	....	....	....	70	15,600	13,600	4	775	775
1915.									
January	7	2,015	6,015	....	....	....	8	1,950	1,950
February	22	29,000	103,400	55	11,000	11,000	7	26,060	26,060
March	20	6,275	6,370	192	38,400	70,800	16	12,500	12,500
Total	189	136,105	401,809	1047	210,500	311,800	104	81,285	82,035

Recapitulation.

	No.	Copies.	Impressions.	Cost.
				$ cts.
Maps	189	136,105	401,809	3,616 29
Township plans	1,047	210,500	311,800	2,800.00
Forms	104	81,285	82,035	738 32
Grand total	1,340	427,890	795,644	7,154.61

APPENDIX No. 8.

OFFICE STAFF of the Topographical Surveys Branch at Ottawa, as on April 1, 1915, with the name, classification, duties of office and salary of each. (Metcalfe street, corner of Slater.)

NAME.	CLASSIFICATION.		Duties of Office.	Salary.
	Division.	Sub-division.		
				$
Deville, E., D.T.S., LL.D.	1	A	Surveyor General	4,000
Shanks, T., B.A.Sc., D.L.S.	1	A	Asst. Surveyor General	2,900
	Correspondence.			
Brady, M.	1	B	Secretary	2,700
Cullen, M. J.	3	A	Clerk	1,200
Williams, E. R.	3	A	"	1,100
Addison, W. G.	3	A	Stenographer	1,000
Renault, J. F.	3	B	"	800
Laforce, D.	3	B	"	500
Pegg, A.			Messenger	800
O'Meara, M. T.			"	700
	Accounts.			
Hunter, R. H.	2	A	Accountant	2,100
Lemay, A.	2	A	Asst. accountant	1,700
McPhail, N. R.	2	B	"	1,050
	Field work.			
Brown, T. E., B.A.	1	B	Supervisor of field work	2,800

DIVISION I.

Survey Instructions and General Information.

Barber, H. G., Grad. S.P.S, D.L.S.	1	B	Chief of division	2,300
Rice, F. W., Grad. School of Min., D.L.S.	2	A	Technical clerk	2,050
MacIlquham, W. L., B.Sc., D.L.S.	2	A	"	2,050
Peaker, W. J., Grad. S.P.S.	2	A	"	1,750
Carroll, M. J., Grad. S.P.S.	2	A	"	1,750
Rochon, E. C.	2	A	"	1,700
McRae, A. D., B.A., B.Sc.	2	A	Supply clerk	1,700
Grant, A. W., B.A.	2	A	Editor	1,700
Hayward, H. E., B.Sc.	2	A	Registration clerk	1,650
Macmillan, J. P., B.E.	2	B	Technical clerk	1,450
Gagnon, J. N. H., B.A.S.	2	B	"	1,200
Armstrong, W. B., B.Sc.	2	B	"	1,350
Nevins, L. A., B.A.	2	B	"	1,350
McDonald, J. F., B.A.	2	B	Registration clerk	1,350
Quinlan, L. J., B.A.Sc.	2	B	Technical clerk	1,300
Gallaher, O. G., B.Sc.	2	B	"	1,250
Miller, A. H., B.A.	2	B	"	1,250
Morgan, A. L., B.Sc.	2	B	"	1,250
Campbell, D. H., B.A.Sc.	2	B	"	1,200
Thompson, N. A., B.Sc.	3	B	"	1,200
Burkholder, E.L.	3	A	Clerk	1,100

APPENDIX No. 8—*Continued.*

DIVISION II.

Examination of Survey Returns and Compilation of Plans.

Name.	Classification.		Duties of Office.	Salary.
	Division	Sub-division.		
				$
Nash, T. S., Grad. S.P.S., D.L.S.	1	B	Chief of division	2,800
Dennis, E. M., B. Sc., D.L.S.	1	B	Surveys examiner	2,200
Hill, S. N., Grad. S.P.S., C.E.	1	B	"	2,200
Elder, A. J., Grad. S.P.S., D.L.S.	2	A	"	2,050
Genest, P. F. X., Q.L.S.	2	A	"	2,050
McClennan, W. D	2	A	"	1,750
Roger, A., O.L.S., D.L.S.	2	A	"	1,750
Sutherland, H. E., B.Sc.	2	A	"	1,700
Ault, H. W.	2	A	"	1,700
Bray, R. P.	2	A	"	1,700
Spreckley, R. O	2	A	"	1,650
Goodday, Leonard	2	B	"	1,550
Harrison, E. W	2	B	"	1,450
Lytle, W. J.	2	B	Recorder	1,200
LaBeree, E. E.	2	B	Surveys examiner	1,200
Jones, G. S., Grad. S.P.S., O.L.S., D.L.S.	2	B	"	1,200
Bradley, J. D.	2	B	"	1 200
Kirwan, G. L., B.A.Sc	2	B	"	1,300
Callander, R., B Sc.	2	B	"	1,250
Cram, R. M., B Sc	2	B	"	1,250
Timbrell, E. G., B.Sc.	2	B	"	1,250
Fraser, A., B.A.Sc	2	B	"	1,200
DesLauriers, J	2	B	"	1,600
Macdonald, J. A	3	B	Clerk	800

DIVISION III.

Drafting and Printing, (Imperial Building, Queen street.)

Engler, Carl, B.A., D.L.S.	1	B	Chief of division	2,400
May, J. E.	2	A	Draughtsman	2,050
Moule, W. J.	2	B	Litho-designer	1,600
Helmer, J. D.	2	B	Draughtsman	1,250
Dawson, R. J.	2	B	Stamper	1,250
Archambault, E.	2	B	Draughtsman & stamper	1,250
Birchall, W. A.	2	B	Draughtsman	1,250
Hall, J.	2	B	"	1,200
Watters, James	3	A	Printer	1,200
Brown, A	3	A	Stamper	1,100
Ebbs, E. J.	3	A	"	1,100
Baril, C	3	A	Clerk	950

DIVISION IV.

British Columbia Surveys, (Imperial Building, Queen street.)

Rowan-Legg, E. L	2	A	Chief of division	2,100
Gillmore, E. T. B., Grad. R.M.C.	2	A	Surveys examiner	2,100
Morley, R. W	2	A	"	2,050
Wilson, E. E. D., B.Sc.	2	A	"	1,800
Harris, K. D.	2	A	"	1,650

APPENDIX No. 8—*Continued.*

DIVISION V.

Mapping, (Imperial Building, Queen street.)

Name.	Classification. Division	Sub-division	Duties of Office.	Salary.
				$
Smith, J.	1	B	Chief of division	2,800
Henderson, F. D., Grad. S.P.S., D.L.S.	1	B	Technical clerk	2,200
Bégin, P. A.	2	A	Draughtsman	2,100
Blanchet, A. E.	2	A	"	1,650
D'Orsonnens, A.	2	A	"	1,750
Flindt, A. H.	2	A	"	1,850
Davies, T. E. S.	2	A	Recorder	1,650
Purdy, W. A.	2	A	Draughtsman	1,650
Bergin, W.	2	B	"	1,250
Blanchard, J. F.	2	B	Technical clerk	1,250
Colquhoun, G. A., B.Sc.	2	B	" "	1,350
Davy, E.	2	B	Draughtsman	1,550
Fitzgerald, C.C., B.Sc.	2	B	Technical clerk	1,200
Hawes, J. H. B.A. Sc	2	B	" "	1,200
Howie, Jas.	2	B.	Draughtsman	1,200
Perrin, V.	2	B	"	1,600
Squire, R. L., B.Sc.	2	B	Technical clerk	1,250
Villeneuve, E.	2	B	Draughtsman	1,250

DIVISION VI.

Special Surveys, (Imperial Building, Queen street.)

Dodge, G. B., D.L.S.	1	B	Chief of division and Supt. Surveys Laboratory	2,800
Watt, G. H. Grad. S.P.S., D.L.S.	2	A	Computer	2,050
Way, W.C., M.Sc	2	A	Asst. Supt. Sur. Laboratory	1,700
Milliken, J. B., B.A., B.Sc., D.L.S.	2	A	Examiner of baseline survey	1,650
Parry, H., B. Eng. D.L.S.	2	A	Mathematician	1,650
Cannell, H. W., D.L.S.	2	A	Computer	1,600
Doxsee, W. W. M.A.	2	B	Laboratory assistant	1,200
Dunlop, J. H., B.Sc.	2	B	Computer	1,200
Field, R. H.	2	B	Laboratory assistant	1,200
Herbert, W. H., B.Sc.	2	B	Computer	1,350
Hughson, W. G., B.Sc.	2	B	Laboratory assistant	1,300
Jeffrey, Miss G., B.A.	2	B	Computer	1,200
Linford, W. J.	2	B	Laboratory assistant	1,200
Roe, B. J.	2	B	Computer	1,300
Ross, R. C., B.Sc.	2	B	"	1,350
Lynch, F. J.	3	B	Stenographer	800
Watson, J. W.	3	B	Clerk	800
Pick, A. C.			Messenger	700

Chief Inspector of Surveys Office, (130 Wellington Street.)

Hubbell, E. W., D.L.S.	1	B	Chief Inspector	2,800
Sylvain, John.	2	B	Assistant	1,850
Stalker, Miss M. W.	3	A	Stenographer	1,100

Board of Examiners for D.L.S.

Côté, J. A., Grad. R.M.C.	2	A	Secretary	1,800
Nolan, Miss A. A.	3	B	Stenographer	550

APPENDIX No. 8—*Concluded.*

Geographic Board, (Woods Building, Slater street.)

Name.	Classification.		Duties of Office.	Salary.
	Division	Sub-division		
				$
Whitcher, A. H., F.R.G.S., D.L.S.	2	A	Secretary.	2,100

Photographic Office, (Metcalfe street, corner Slater street.)

Carruthers, H. K.	2	A	Process photographer.	2,050
Woodruff, John	2	A	Chief "	2,050
Owen, E. R.	2	B	Asst. photographer	850
Collins, G. H. A.	2	B	Photographer	1,050
Whitcomb, H. E.	3	A	"	1,200
Morgan, W. E.	3	A	"	1,200
Kilmartin, A.	3	A	Asst. photographer	1,100
Ouimet, E. G.	3	B	" "	1,000
Bourbeau, J. A.			" "	700

Lithographic Office, (Imperial Building, Queen street.)

Name.	Occupation.	Salary.
Moody, A.	Foreman	$28 00 per week.
Burnett, E.	Lithographer	25 00 "
Thicke, C. R.	"	24 00 "
Deslauriers, J. H.	Transferrer	21 00 "
Bergin, J.	Printer	22 00 "
Thicke, H. S.	"	21 00 "
Boyle, S.	Stone polisher	16 00 "
Gagnon, J.	Press feeder	13 00 "
Kane, P.	"	11 50 "
Easton, R. M.	Printer	21 00 "
Hare, E. H.	Asst. photographer	16 00 "
Gordon, W.	Litho-transferrer	21 00 "
Perkins, I. J.	Asst. phttographer	10 00 "

APPENDIX No. 9.

LIST of Dominion Land Surveyors who are in possession of Standard Measures.

Name.	Address.	Date of Birth.	Date of Appointment or of Commission.	Remarks.
Akins, James Robert	Ottawa, Ont	Sept. 2, '76	Mar. 14, '10	
Allison, Calvin Bruce	South Woodslee, Ont.	June 16, '84	Mar. 28, '10	O.L.S.
Ashton, Arthur Ward	Not known.	Nov. 5, '80	May 29, '08	B.C.L.S.
Austin George Frederick	Not known		April 14, '72	
Aylen, John	North Bay, Ont.		May 29, '85	
Aylsworth, Charles Fraser	Madoc, Ont.	April 21, '62	May 13, '86	O.L.S.
Baker, James Clarence	Vermilion, Alta.	May 12, '78	May 18, '06	A.L.S.
Baker, Mason Hermon	St. Thomas, Ont.	July 9, '84	Aug. 6, '08	O.L.S.
Bartlett, Ernest	Medicine Hat, Alta.	——— '83	Jan. 16, '11	A.L.S.
Bayne, George A.	Winnipeg, Man.	Oct. 25, '50	April 14, '72	M.L.S.
Beatty, David	Parry Sound, Ont.	Dec. 22, '42	April 14, '72	O.L.S.
Beatty, Frank Weldon	Pembroke, Ont.	July 12, '92	May 18, '14	
Begg, William Arthur	Hamilton, Ont.	July 15, '82	June 8, '09	S.L.S.
Belanger, Phidime Roch Arthur	Ottawa, Ont.	Mar. 5, '53	May 17, '80	Inspector of Surveys, Topographical Surveys Branch, Dept. of the Interior.
Belleau, Joseph Alphonse	Ottawa, Ont	Sept. 30, '76	May 15, '83	Land Patents Branch, Department of Interior.
Belyea, Albert Palmer Corey	Edmonton, Alta.		July 14, '09	A.L.S.
Bennister, George Bartlett	Winnipeg, Man.		June 11, '78	M.L.S. Engineering Dept. C.N.R.
Bennett, George Arthur	Ottawa, Ont.	May 18, '86	Aug. 25, '10	A.L.S.
Berry, Edward Wilson	Seaforth, Ont.	Aug. 26, '81	May 18, '11	
Bigger, Charles Albert	Ottawa, Ont.	Aug. 15, '53	Mar. 30, '82	B.C.L.S., O.L.S., Assistant Superintendent Geodetic Surveys.
Bingham, Edwin Ralph	Fort William, Ont.	——— '78	Oct. 25, '06	O.L.S.
Bingham, Harold Carr	Moosejaw, Sask.	Aug. 7, '88	Mar. 13, '14	S.L.S.
Blanchet, Guy Houghton	Ottawa, Ont.	Feb. 12, '84	Mar. 10, '10	
Boivin, Elzear	Edmonton, Alta	June 13, '57	Nov. 13, '83	
Boswell, Elias John	Montreal, Que	Sept. 26, '70	Mar. 18, '03	O.L.S., M.L.S.
Boulton, William James	Wallaceburg, Ont.	Oct. 2, '84	Mar. 7, '12	
Bourgeault, Armand	St. Jean Port Joli, Que	Feb. 23, '58	Mar. 29, '83	Q.L.S.
Bourgault, Charles Eugene	Lauzon, Levis, Que.	Sept. 6, '61	Feb. 21, '88	
Bourget, Charles Arthur	Lauzon, Que.	Aug. 26, '51	May 14, '84	Q.L.S.
Bowman, Edgar Peterson	West Montrose, Ont.	Sept. 29, '83	Sept. 26, '07	O.L.S.
Bowman, Herbert Joseph	Berlin, Ont.	June 18, '65	Feb. 16, '88	O.L.S.
Brabazon, Alfred James	Ottawa, Ont.		May 13, '82	Boundary Surveys, Dept. of the Interior.
Bray, Samuel	Ottawa, Ont	Nov. 5, '46	Nov. 14, '83	O.L.S., Chief Surveyor, Dept. of Indian Affairs.
Bray, Lennox Thomas	Edmonton, Alta.	Mar. 14, '77	Feb. 18, '03	O.L.S., A.L.S.
Brenot, Lucien	Ottawa, Ont.	Aug. 31, '87	Mar. 18, '10	
Bridgland, Morrison Parsons	Calgary, Alta.	Dec. 20, '78	Mar. 10, '05	A.L.S.
Broughton, George Henry	Penticton, B.C.	Aug. 12, '86	June 3, '09	B.C.L.S.
Brown, Charles Dudley	Winnipeg, Man.	Feb. 25, '83	April 4, '10	A.L.S., S.L.S.
Brown, Edgar Carl	Winnipeg, Man.	Nov. 28, '86	May 23, '11	A.L.S., S.L.S.
Brown, Thomas Wood	Saskatoon, Sask.	Nov. 10, '79	June 21, '09	A.L.S., S.L.S.
Brownlee, James Harrison	Vancouver, B. C.	Mar. 22, '56	April 15, '87	M.L.S., B.C.L.S., Director of Surveys, Yukon Territory.
Buchanan, John Alexander	Edmonton, Alta.	Mar. 4, '87	May 17, '12	A.L.S.
Burd, James Henry	Weyburn, Sask.	Sept. 7, '71	May 18, '11	O.L.S., S.L.S.
Burgess, Edward LeRoy	Kamloops, B.C.	May 5, '78	Feb. 23, '05	O.L.S.
Burnet, Hugh	Victoria, B.C.		June 22, '85	O.L.S., B.C.L.S.
Burwash, Nathaniel Alfred	Toronto, Ont.	Sept. 28, '79	Mar. 6, '07	O.L.S.
Burwell, Herbert Mahlon	Vancouver, B.C.	Oct. 23, '63	Feb. 17, '87	B.C.L.S.
Calder, John Alexander	Lytton, B.C.	June 2, '86	May 21, '12	
Cameron, Charles Scott	Beaverton, Ont.	Dec. 6, '84	Mar. 15, '13	
Campbell, Alan John	Sidney, B.C.	Oct. 1, '82	April 13, '09	B.C.L.S., A.L.S.
Campbell, Alexander Stewart	Kingston, Ont.	Mar. 7, '80	Mar. 6, '09	O.L.S.

APPENDIX No. 9—*Continued.*

LIST of Dominion Land Surveyors who are in possession of Standard Measures.—*Continued.*

Name.	Address.	Date of Birth.	Date of Appointment or of Commission.	Remarks.
Carbert, Joseph Alfred	Medicine Hat, Alta.	Feb. 4, '56	May 12, '80	O.L.S., A.L.S., District Engineer and Surveyor, Dept. of Public Works, Alberta.
Carpenter Henry Stanley	Regina, Sask.	Feb. 8, '74	Feb. 20, '01	O.L.S., S.L.S., Department of Public Works.
Carroll, Cyrus	Regina, Sask.	Dec. 6, '34	April 14, '72	O.L.S., S.L.S.
Carson, John Alton	Vancouver, B.C.	Aug. 10, '89	May 18, '14	
Carson, Percy Alexander	Calgary, Alta.	Dec. 25, '77	Feb. 22, '06	
Carthew, William Morden	Edmonton, Alta.	Oct. 19, '86	Mar. 29, '10	A.L.S.
Carthew, John Trewalla	Edmonton, Alta.	Feb. 15, '91	Mar. 15, '13	
Cautley, Reginald Hutton	Edmonton, Alta.	Dec. 6, '79	May 1, '05	A.L.S.
Cautley, Richard William	Edmonton, Alta.	Aug. 3, '73	Sept. 2, '96	A.L.S.
Cavana, Allan George	Orillia, Ont.	Jan. 22, '58	Nov. 16, '76	O.L.S.
Charlesworth, Lionel Clare	Edmonton, Alta.	Nov. 17, '73	Mar. 24, '03	O.L.S., A.L.S., Director of Surveys, Dept. of Public Works, Alberta.
Chase, Albert Victor	Orillia, Ont.	Mar. 4, '83	Oct. 11, '10	O.L.S.
Chilver, Charles Alonzo	Walkerville, Ont.	Feb. 8, '83	Feb. 22, '07	
Christie, William	Prince Albert, Sask	Feb 13, '76	Mar. 22, '06	S.L.S.
Clarke, Frederick Fieldhouse	Toronto, Ont.	Aug. 22, '78	Feb. 18, '08	O.L.S.
Clarke, Charles Wentworth	Regina, Sask.	Nov. 19, '75	Mar. 24, '10	S.L.S.
Cleveland, Ernest Albert	Vancouver, B.C.	May 12, '74	June 27, '99	B.C.L.S.
Coates, Preston Charles	Victoria, B.C.	May 16, '81	April 19, '07	B.C.L.S.
Cokely, Leroy S.	Duncan, B.C.	Nov. 23, '84	Mar. 22, '10	B.C.L.S
Coltham, George William	Aurora, Ont.	Feb. 19, '89	Mar. 15, '13	O.L.S.
Cond, Fritz Thomas Percy	Vancouver, B.C.	May 16, '86	May 18, '11	B.C.L.S.
Côté, Joseph Adelard	Prince Albert, Sask	June 5, '64	May 14, '84	S.L.S.
Côté, Jean Léon	Edmonton, Alta.	May 6, '67	Mar. 21, '90	A.L.S.
Côte, Joseph Martial	Ottawa, Ont	Aug. 25, '89	May 13, '13	
Cotton, Arthur Frederick	Massett, B.C.	Aug. 8, '52	May 11, '80	O.L.S., B.C.L.S.
Cowper, George Constable	Welland, Ont.	Oct. 20, '86	Mar. 11, '11	
Craig, John Davidson	Ottawa, Ont.	Jan. 30, '76	Feb. 24, '02	Boundary Surveys, Dept. of the Interior.
Cumming, Austin Lewis	Edmonton, Alta.	Aug. 25, '82	Feb. 3, '10	A.L.S.
Cummings, Alfred	Fernie, B.C.	July 3, '80	Mar. 3, '09	B.C.L.S.
Cummings, John George	Cranbrook, B.C.	Nov. 19, '73	Feb. 17, '04	B.C.L.S.
Dalton, John Joseph	Weston, Ont	June 12, '54	April 17, '79	O.L.S., D.T.S.
Davies, Thomas Atwood	Edmonton, Alta.		Feb. 22, '06	A.L.S.
Dawson, Frederick James	Kamloops, B.C.	Sept. 22, '86	Sept. 12, '10	B.C.L.S.
Day, Harry Samuel	Edmonton, Alta.	Nov. 14, '85	Mar. 9, '10	A.L.S.
Deans, William James	Brandon, Man.	May 4, '60	May 13, '86	O.L.S., Inspector of Surveys, Dept. of the Interior.
de la Condamine, C	Calgary, Alta.	Feb. 13, '75	May 4, '10	A.L.S.
Dennis, John Stoughton	Calgary, Alta.	Oct. 22, '56	Nov. 19, '77	D.T.S., Asst. to President of C.P.R.
Denny, Herbert C	Not known.		April 1, '82	
Dickson, Henry Godkin	Whitehorse, Y.T.	Mar. 29, '64	Mar. 19, '89	M.L.S.
Dickson, James	Fenelon Falls, Ont.	Oct. 30, '34	April 14, '72	O.L.S.
Dobie, James Samuel	Thessalon, Ont.	Oct. 15, '73	Mar. 22, '06	O.L.S.
Donnelly, Cecil	Winnipeg, Man.	Oct. 18, '89	Mar. 15, '13	M.L.S.
Doupe, Jacob Lonsdale	Winnipeg, Man.	Sept. 14, '67	Oct. 6, '88	M.L.S., A.L.S., S.L.S., Assist. Land Commissioner for C.P.R.
Drewry, William Stewart	Victoria, B.C.	Jan. 20, '59	Nov. 14, '83	O.L.S., B.C.L.S.
Driscoll, Alfred	Edmonton, Alta.	July 2, '65	Feb. 23, '87	B.C.L.S., A.L.S.
Drummond, Thomas	Montreal, P.Q.	1856	June 24, '78	D.T.S.
Ducker, William A	Winnipeg, Man.	April 4, '52	Mar. 30, '83	O.L.S., M.L.S.
Duffield, Hugh Johnston	Calgary, Alta.	Feb. 27, '72	May 18, '14	
Dumais, Paul T. Concorde	Hull, P.Q.	Jan. 2, '47	Mar. 29, '82	Q.L.S.
Earle, Wallace Sinclair	Vancouver, B.C.	Feb. 8, '89	May 18, '11	B.C.L.S., O.L.S.
Edwards, George	Ponoka, Alta.	June 13, '42	April 14, '72	O.L.S., A.L.S.

APPENDIX No. 9—*Continued.*

LIST of Dominion Land Surveyors who are in possession of Standard Measures—*Continued.*

Name.	Address.	Date of Birth.	Date of Appointment or of Commission.	Remarks.
Edwards, William Milton	Lethbridge, Alta	June 21, '79	April 5, '10	A.L.S.
Ellacott, Charles Herbert	Victoria, B.C.	Dec. 24, '66	Feb. 22, '99	B.C.L.S.
Ellis, Douglas Stewart	Kingston, Ont	Mar. 16, '85	May 17, '12	
Empey, John Morgan	Calgary, Alta	Apr. 16, '74	Feb. 23, '05	O.L.S., A.L.S.
Engler, Carl	Ottawa, Ont	Sept. 30, '72	Feb. 23, '05	T. S. Branch, Dept. of the Interior.
Evans, Stanley Livingstone	Corinth, Ont	Jan. 14, '84	Feb. 13, '11	
Ewan, Hedley Jenkins	Yarmouth N.S.	Nov. 23, '91	Mar. 13, '14	
Fairchild, Charles Courtland	Edmonton, Alta.	Feb. 21, '67	Feb. 20, '01	O.L.S., A.L.S.
Farncomb, Alfred Ernest	Edmonton (South) Alta.	May 22, '73	Mar. 12, '02	O.L.S., A.L.S.
Fawcett, Adam	Gravenhurst, Ont		Feb. 22, '93	
Fawcett, Sydney Dawson	Ottawa, Ont	Oct. 29, '82	May 18, '11	
Fawcett, Thomas	Ottawa, Ont	Oct. 28, '48	Nov. 18, '76	O.L.S., D.T.S. Boundary Surveys Dept. of the Interior.
Ferguson, George Hendry	Ottawa, Ont	Jan. 20, '83	June 2, '09	
Findlay, Allan	Winnipeg, Man.	Oct. 15, '80	Mar. 21, '08	M.L.S.
Fletcher, James Allan	Fletcher, Ont.	Mar. 26, '89	May 18, '11	
Fontaine, Louis Elie	Levis, P.Q.	Oct. 3, '68	Nov. 30, '92	A.L.S., Inspector of Surveys, Dept. of the Interior.
Francis, John	Portage la Prairie, Man.	Dec. 22, '52	June 17, '75	M.L.S.
Galletly, James Simpson	Oshawa, Ont.	April 15, '88	May 18, '11	
Garden, James Ford	Vancouver, B. C.	Feb. 19, '47	May 13, '80	B.C.L.S.
Garden, George H	Lethbridge, Alta.		April 14, '72	Deputy Surveyor for N.B.
Garden, Charles	Not known		April 14, '72	Deputy Surveyor for N.B.
Garner, Albert Coleman	Regina, Sask	Sept. 6, '78	May 27, '07	S.L.S., A.L.S. Chief Surveyor Surveys Branch Land Titles Offices.
Gauvreau, Louis Pierre	Not known		April 14, '72	
Gibbon, James	Vancouver, B. C.	June 25, '60	Feb. 12, '91	O.L.S.
Glover, Arthur Edward	Edmonton, Alta	Mar. 4, '87	Mar. 11, '11	A.L.S., S.L.S.
Gordon, Maitland Lockhart	Vancouver, B. C.	Sept. 27, '82	Feb. 18, '04	B.C.L.S.
Gordon, Robert John	Lethbridge, Alta.	June 18, '69	Mar. 12, '02	A.L.S.
Gore, Thomas Sinclair	Victoria, B.C.	1852	April 19, '79	B.C.L.S.
Graham, John Robertson	Vancouver, B. C.	April 18, '87	May 26, '10	B.C.L.S.
Grassie, Charles Andrew	Medicine Hat, Alta	Dec. 24, '83	Dec. 27, '10	A.L.S.
Gray, James Edward	Edmonton, Alta.	Oct. 12, '81	Mar. 11, '11	A.L.S., S.L.S.
Green, Alfred Harold	Nelson, B.C.	Jan. 20, '78	Feb. 23, '05	B.C.L.S., A.L.S.
Green, Thomas Daniel	Rocky Mountain House, Alta.	Dec. 21, '57	May 19, '84	O.L.S.
Green, Frank Compton	Victoria, B.C	May 4, '73	May 8, '03	B.C.L.S.
Griffin, Albert Dyke	Elk Lake, Ont	Dec. 14, '60	May 13, '13	O.L.S.
Grover, George Alexander	Toronto, Ont.		Feb. 18, '04	
Haggen, Rupert Williams	Quesnel, B.C.	July 29, '87	May 18, '11	B.C.L.S.
Hamilton, Charles Thomas	Vancouver, B. C.	July 29, '84	May 18, '11	B.C.L.S.
Hamilton, James Frederick	Lethbridge, Alta.	April 4, '69	June 2, '09	A.L.S.
Harris, John Walter	Winnipeg, Man	Feb. 26, '45	April 14, '72	O.L.S., M.L.S., Assessment Commissioner and City Surveyor.
Harrison, Edward	Calgary, Alta.		May 14, '10	A.L.S.
Harvey, Charles	Kelowna, B.C.	May 5, '76	Feb. 17, '04	B.C.L.S.
Hawkins, Albert Howard	Listowel, Ont.	July 27, '62	Mar. 6, '06	
Heaman, John Andrew	Winnipeg, Man.	June 3, '75	July 15, '09	O.L.S.
Heathcott, Robert Vernon	Edmonton, Alta.	July 7, '81	May 13, '07	A.L.S.
Henderson, Walter	Not known		Nov. 17, '83	
Hermon, Ernest Bolton	Vancouver, B.C.		June 22, '85	
Herriot, George Henry	Souris, Man.	Feb. 23, '83	Sept. 18, '09	M.L.S.
Heuperman, Frederick Justinus	Calgary, Alta.	July 23, '87	Mar 13, '11	A.L.S.
Heuperman, Lambertus Fred	Calgary, Alta.	Sept. 20, '81	Mar. 29, '10	A.L.S.
Hoar, Charles Millard	Calgary, Alta.	Sept. 26, '85	Mar. 9, '11	A.L.S.
Hobbs, Wilfrid Ernest	Winnipeg, Man.	Mar. 12, '87	Mar. 5, '12	M.L.S.

APPENDIX No. 9—*Continued.*

List of Dominion Land Surveyors who are in possession of Standard Measures.—*Continued.*

Name.	Address.	Date of Birth.	Date of Appointment or of Commission.	Remarks.
Holcroft, Herbert Spencer. ...	Toronto, Ont.....	Sept. 4, '77	Feb. 18, '03	O.L.S.
Hopkins, Marshall Willard ...	Edmonton, Alta ...	May 24, '61	Feb. 20, '01	O.L.S., A.L.S.
Hubbell, Ernest Wilson.....	Ottawa, Ont.....	Nov. 5, '62	May 19, '84	Chief Inspector of Surveys, Dept. of the Interior.
Inkster, Oluff	Edmonton, Alta....	Mar. 25, '85	May 18, '11	A.L.S.
Jackson, John Edwin	Hamilton, Ont.....	Dec. 27, '81	May 18, '11	O.L.S.
James, Silas.....	Toronto, Ont.	June 19, '34	Apr. 14, '72	O.L.S.
Jephson, Richard Jermy	Brandon, Man.....	Feb. 5, '54	May 12, '80	O.L.S., B.C.L.S., M.L.S.
Johnson, Alfred William.....	Kamloops, B.C.	Feb. 23, '74	Mar. 12, '02	B.C.L.S.
Johnston, Percy Nowell	Edmonton, Alta...	Oct. 4, '75	May 10, '09	
Johnston, James Homer.	Edmonton, Alta	Aug. 23, '87	May 17, '12	A.L.S.
Johnston, William James.	St. Catharines, Ont..	Jan. 31, '81	Mar. 11, '11	
Keith, Homer Pasha	Edmonton, Alta....	Aug. 30, '85	Feb. 1, '11	A.L.S.
Kimpe, Maurice...	Edmonton, Alta ..	Jan. 17, '76	May 13, '07	A.L.S.
King, William Frederick	Dominion Observatory, Ottawa, Ont.	Feb. 19, '54	Nov. 21, '76	D.T.S. Chief Astronomer, Dept. of the Interior.
Kirk, John Albert.....	Summerland, B.C...	Jan. 9, '54	May 11, '80	O.L.S., B.C.L.S.
Kitto, Franklin Hugo...	Ottawa, Ont.....	Mar. 28, '80	Mar. 6, '08	Mining Landsand Yukon Br., Dept- of Interior.
Klotz, Otto Julius	Dominion Observatory, Ottawa, Ont.	Mar. 31, '52	Nov. 19, '77	O.L.S., D.T.S., Astronomer, Dept. of Interior.
Knight, Richard H.	Edmonton, Alta....	June 7, '77	Feb. 18, '04	A.L.S.
Lamb, Frederick Carlyle.....	Saskatoon, Sask	Dec. 11, '88	May 17, '12	
Lang, John Leiper...	Sault Ste Marie, Ont.	Aug. 18, '84	Oct. 14, '08	O.L.S.
Latimer, Frank Herbert	Penticton, B.C.....	May 23, '60	Nov. 13, '85	B.C.L.S.
Laurie, Richard C	Battleford, Sask....	Jan. 31, '58	April 27, '83	S.L.S.
Leblanc, Pierre Maxime Henri	Ottawa, Ont.....	Oct. 1, '84	May 13, '13	
Lee, Roger Melville..... ...	Saskatoon, Sask.....	—— '82	May 11, '11	O.L.S.
Lemoine, Charles Errol.....	Ville Montcalm,P.Q.	....	Mar. 31, '82	Q.L.S.
Lighthall, Abram.....	Vancouver, B C.....	Mar. 30, '78	Dec. 23, '09	
Lindsay, James Herbert.. .	Prince Albert, Sask.	Nov. 27, '82	May 18, '11	S.L.S.
Lonergan, Gerald Joseph	Buckingham, P.Q...	Oct. 8, '71	Feb. 28, '01	Q.L.S., A.L.S., Inspector of Surveys, Dept. of Interior.
Loucks, Roy Wm. Egbert.....	Saskatoon, Sask. ...	Oct. 31, '84	Mar. 1, '12	A.L.S., S.L.S.
Lumsden, Hugh David.....	St. Andrews, N.B...	Sept. 7, '44	April 14, '72	O.L.S.
Macdonald, Colin Stone.....	Ottawa, Ont.....	May 26, '87	Mar. 10, '14	
Macdonald, Gordon Alexander.	Muirkirk, Ont.....	May 24, '85	May 17, '12	B.C.L.S.
MacLennan, Alexander L.....	Toronto, Ont.	May 10, '78	Feb. 23, '05	S.L.S.
MacLeod, George Waters....	Edmonton, Alta....	—— '88	Mar. 1, '12	A.L.S.
MacPherson, Charles Wilfrid..	Dawson, Y.T.	Sept. 6, '71	Mar. 7, '00	O L.S.
Magrath, Charles Alexander...	Ottawa, Ont	April 22, '60	Nov. 16, '81	O.L.S., B.C.L.S., D.T.S. Member International Waterways Commission.
Martindale, Ernest Smith.....	Kingsmill, Ont.....	May 26, '86	Mar. 11, '11	
Martyn, Oscar William.....	Regina, Sask..	Dec. 2, '88	Mar. 11, '11	S.L.S.
Matheson, Hugh.....	Ottawa, Ont.....	May 2, '79	May 9, '11	
McArthur, James Joseph	Ottawa, Ont.....	May 9, '56	April 17, '79	Boundary Surveys, Dept. of Interior.
McCaw, Robert Daniel.....	Sidney, B.C.....	May 24, '83	Mar. 23, '09	O.L.S., B C.L.S., A.L.S.
McColl, Gilbert Beebe.....	Winnipeg, Man....	Oct. 8, '82	Mar. 20, '07	M.L.S., D.T.S.
McCall, Samuel Ebenezer....	Winnipeg, Man.....	July 17, '86	May 18, '11	M.L.S.
McDiarmid, Stuart Stanley...	Vancouver, B.C.	Aug. 4, '81	Feb. 23, '05	B.C.L.S.
McDonald, Harold French . .	Winnipeg, Man.....	Nov. 22, '85	Mar. 3, '13	M.L.S., S.L.S., A.L.S.
McElhanney, Thomas Andrew.	Vancouver, B.C.....	April 21, '86	Mar. 17, '12	
McElhanney, William Gordon.	Vancouver, B.C.....	Mar. 10, '77	Jan. 7, '11	
McEwen, Duncan Findlay	Edmonton, Alta ...	Aug. 7, '76	May 18, '11	A.L.S.
McFadden, Moses	Vancouver, B.C.....	Aug. 26, '26	April 14, '72	O.L.S., M.L.S.

APPENDIX No. 9—*Continued.*

List of Dominion Land Surveyors who are in possession of Standard Measures.—*Continued.*

Name.	Address.	Date of Birth	Date of Appointment or of Commission.	Remarks.
McFarlane, Walter Graham..	Peace River Crossing, Alta.....	Sept. 28, '75	May 19, '05	A.L.S.
McFarlane, John Baird.....	Toronto, Ont.....	Feb. 25, '79	June 3, '08	A.L.S.
McFee, Angus.....	Red Deer, Alta....	July 14, '46	April 19, '79	A.L.S.
McGeorge, William Graham...	Chatham, Ont	Mar. 22, '87	Mar. 31, '10	O.L.S.
McGrandle, Hugh	Wetaskiwin, Alta...	Mar. 12, '57	Mar. 30, '83	O.L.S., A.L.S.
McKay, Robert B	Vancouver, B.C.....	April 21, '83	May 21, '12	
McKnight, James Henry . ..	Simcoe, Ont	July 13, '85	May 13, '13	
McLellan, Roy Alexander.....	Toronto, Ont.....	July 31, '89	Mar. 15, '13	
McMaster, William Angus Alexander.....	Prince Albert, Sask.	Feb. 1, '85	July 6, '10	A.L.S., S.L.S.
McMillan, George	Calgary, Alta.....	Dec. 9, '69	Feb. 22, '06	
McNaughton, Alexander L....	Kelowna, B.C	Sept. 30. '81	Feb. 23, '05	O.L.S., B.C.L.S.
McPherson, Archibald John...	Regina, Sask.	—— '70	Feb. 21, '01	S.L.S.
McPhillips, Robert Charles....	Winnipeg, Man.....	April 24, '56	May 17, '80	M.L.S.
McVittie, Archibald W.	Victoria, B.C.....	May 5, '58	Mar. 30, '82	B.C.L.S.
Meadows, William Walter .. .	Maple Creek, Sask..	May 27, '73	Feb. 23, '05	O.L.S., S.L.S.
Melhuish, Paul	Vancouver, B.C	April 14, '87	May 18, '11	B.C.L.S.
Miles, Charles Falconer.	Toronto, Ont.	Jan. 30, '38	April 14, '72	O.L.S., Inspector of Surveys, Dept. of Interior.
Mitchell, Benjamin Foster....	Edmonton, Alta....	June 16, '80	April 16, '08	A.L.S.
Moberly, Harford Kenneth....	Yorkton, Sask. .	—— '69	April 21, '03	S.L.S.
Montgomery, Royal Harp....	Prince Albert, Sask.	May 20, '82	Feb. 23, '05	O.L.S., S.L.S.
Moore, Herbert Harrison.....	Calgary, Alta.....	Dec. 1, '69	Feb. 17, '04	A.L.S.
Morrier, Joseph Eldedge. ...	Prince Albert, Sask.	Aug. 29, '74	May 16, '07	S.L.S.
Murray, Ernest William	Regina, Sask.	Mar. 20, '84	May 31, '10	S.L.S.
Narraway, Athos Maxwell.....	Ottawa, Ont..... ...	July 19, '88	May 18, '11	
Neelands, Rupert A..... ...	Hamiota, Man.....	Aug. 26, '84	Mar. 5, '12	
Nelles, Douglas Henry.....	Ottawa, Ont.....	Mar. 26, '81	Mar. 9, '07	Geodetic Surveys, Dept. of the Interior.
Nesham, Edward Williams....	Ottawa, Ont.....	June 10, '88	Mar. 15, '13	Geodetic Surveys, Dept. of the Interior.
Neville, Everett A..	Vancouver, B. C...	Jan. 8, '87	May 18, '11	B.C.L.S.
Norrish, William Henry.....	Ottawa, Ont.....	May 10, '92	May 13, '14	
O'Hara, Walter Francis.....	Ottawa, Ont	Mar. 31, '69	Feb. 19, '95	O.L.S.
Ord, Lewis Redman.....	Hamilton, Ont.....	Oct. 17, '56	April 1, '82	O.L.S.
Palmer, Philip Ebenezer....	Dorchester, N.B....	May 6, '88	Mar. 7, '12	
Parsons, Johnstone Lindsay R.	Regina, Sask.....	Jan. 18, '76	Feb. 23, '05	O.L.S., S.L.S.
Patrick, Allan Poyntz.....	Calgary, Alta. ...	July 18, '49	Nov. 19, '77	B.C.L.S., D.T.S., A.L.S.
Patten, Thaddeus James	Little Current, Ont..	Feb. 4, '59	Mar. 29, '83	O.L.S.
Pearce, William.....	Calgary, Alta.....	Feb. 1, '48	May 10, '80	O.L.S., B.C.L.S., A.L.S.
Pearce, Seabury Kains.....	Calgary, Alta.....	Dec. 6, '87	Mar. 9, '11	A.L.S.
Pearson, Hugh Edward..	Edmonton, Alta ...	Oct. 17, '87	May 17, '12	A.L.S.
Pequegnat, Marcel.....	Berlin, Ont.	April 27, '86	June 6, '10	O.L.S.
Peters, Frederic Hatheway....	Calgary, Alta.....	Nov. 4, '83	Mar. 4, '10	A.L.S., Com. of Irrigation
Phillips, Edward Horace.....	Saskatoon, Sask.....	Dec. 19, '78	Feb. 21, '02	S.L.S.
Phillips, Harold Geoffrey.....	Regina, Sask.	Sept. 3, '87	April 23, '10	S.L.S.
Pierce, Benjamin Clifford.....	Kingston, Ont . ..	Nov. 5, '90	Mar. 13, '14	
Pierce, John Wesley..... ...	Ottawa, Ont.....	July 14, '85	Dec. 24, '09	O.L.S.
Pinder, George Zouch.....	Edmonton, Alta	Mar. 5, '81	Mar. 15, '13	
Plunkett, Thomas Hartley	Meaford, Ont.....	June 1, '78	Mar. 12, '08	
Powell, William Henry.	Vancouver, B.C.....	Dec. 22, '84	Feb. 22, '11	B.C.L.S.
Proudfoot, Hume Blake	Prince Albert, Sask.	June 23, '58	Mar. 28, '82	O.L.S., S.L.S.
Purser, Ralph Clinton.....	Windsor, Ont.	April 7, '86	Feb. 2, '11	
Rainboth, Edward Joseph.....	Ottawa, Ont	.....	May 19, '81	Q.L.S., O.L.S.
Ransom, John Thomas	Toronto, Ont.....	Aug. 24, '88	Jan. 14, '11	O.L.S.
Reilly, William Robinson.	Regina, Sask.....	Aug. 10, '57	Nov. 17, '81	O.L.S., M.L.S., S.L.S.
Richard, Joseph Francois.	Ste. Anne de la Pocatière, P.Q.....	....	May 13, '82	Q.L.S.
Rinfret, Claude.....	Montreal, P.Q	Jan. 5, '86	Mar. 20, '08	Q.L.S.
Rinfret, Raoul	Montreal, P.Q.....	July 16, '56	Feb. 20, '00	Q.L.S.

APPENDIX No. 9—*Continued.*

LIST of Dominion Land Surveyors who are in possession of Standard Measures.—*Continued.*

Name.	Address.	Date of Birth.	Date of Appointment or of Commission.	Remarks.
Ritchie, Joseph Frederick.	Prince Rupert, B.C.	May 23, '63	Jan. 7, '89	B.C.L.S.
Roberts, Otto Beer	Kingston, Ont	Oct. 19, '87	May 13, '14	
Roberts, Sydney Archibald	Victoria, B.C.	April 10, '48	May 16, '85	B.C.L.S.
Roberts, Vaughan Maurice	Goderich, Ont.	Mar. 22, '64	May 17, '86	
Robertson, Donald Fraser	Ottawa, Ont.	'80	May 25, '09	Dept. of Indian Affairs.
Robertson, Henry H.	N.Timiskaming, P.Q	Sept. 13, '47	April 14, '72	Q.L.S.
Robertson, Edgar Doctor	Edmonton, Alta.	Sept. 12, '85	Mar. 15, '13	
Robinson, Ernest Walter P.	Ottawa, Ont.	May 8, '80	May 1, '08	
Robinson, Franklin Joseph	Regina, Sask.	Oct. 20, '70	Feb. 20, '00	S.L.S., Chairman of Board of Highway Commissioners.
Robinson, William Andrew	Winnipeg, Man.	Feb. 21, '81	Oct. 2, '11	S.L.S., M.L.S.
Rolfson, Orville	Walkerville, Ont.	Feb. 26, '85	July 11, '08	
Rombough, Marshall Bedwell	Morden, Man.	Oct. 14, '35	April 14, '72	M.L.S.
Rorke, Louis Valentine	Toronto, Ont.	Feb. — '65	Aug. 13, '91	O.L.S., Inspector of Surveys for Ontario.
Ross, George	Welland, Ont.	June 12, '53	Nov. 21, '82	O.L.S.
Ross, Joseph Edmund	Kamloops, B.C.	Jan. 9, '61	Feb. 12, 91	O.L.S., B.C.L.S.
Routly, Herbert Thomas	Toronto, Ont.	Jan. 20, '78	Feb. 15, '11	O.L.S.
Roy, George Peter	Quebec, P.Q.	Oct. 1, '52	Nov. 17, '81	Q.L.S.
Roy, Joseph George Emile	Quebec, P.Q	Mar. 14, '86	May 25, '10	Q.L.S.
Russell, Alexander Lord	Port Arthur, Ont.		April 14, '72	O.L.S.
Saint Cyr, Jean Baptiste	Montreal, P.Q.	Dec. 17, '66	Feb. 17, '87	Q.L.S.
Saint Cyr, Arthur	Ottawa, Ont.	Nov. — '60	Feb. 17, '87	
Saunders, Bryce Johnston	Edmonton, Alta	Oct. 17, '60	Nov. 16, '84	O.L.S.
Scott, Walter Alexander	Calgary, Alta.	Aug. 8, '85	Mar. 9, '09	A.L.S., S.L.S.
Seager, Edmund	Kenora, Ont.	Nov. 22, '38	April 14, '72	O.L.S.
Segré, Beresford Henry	Davidson, Sask.	Feb. 19, '86	May 8, '12	
Seibert, Frederick V.	Edmonton, Alta.	Nov. 5, '85	Mar. 11, '11	O.L.S., S.L.S.
Sewell, Henry DeQuincy	Toronto, Ont.	April 18, '48	May 16, '85	O.L.S.
Seymour, Horace Llewellyn	Ottawa, Ont.	June 11, '82	Feb. 22, '06	O.L.S., A.L.S., S.L.S., T.S Branch Dept. of the Interior.
Shaver, Peter Albert	Calgary, Alta.	Sept. 24, '69	May 18, '14	
Shaw, Charles Æneas	Greenwood, B.C.	Nov. 16, '53	May 10, '80	O.L.S., B.C.L.S.
Shepley, Joseph Drummond	N. Battleford, Sask.	Sept. 13, '79	Mar. 12, '06	S.L.S.
Smith, Charles Campbell	Vancouver, B.C.	Jan. 1, '73	Feb. 22, '06	O.L.S.
Smith, Donald Alpine	Regina, Sask.	Sept. 22, '86	April 21, '10	S.L.S.
Smith, James Herbert	Edmonton, Alta.	Nov. 9, '76	Feb. 23, '05	A.L.S., O.L.S.
Soars, Henry Martin Robinson	Edmonton, Alta	April 22, '77	Nov. 2, '08	A.L.S.
Speight, Thomas Bailey	Toronto, Ont.	Feb. 8, '59	Nov. 16, '82	O.L.S.
Starkey, Samuel M.	Codys, N.B	Sept. 4, '57	April 14, '72	P.L.S. for N.B.
Steele, Ira John	Ottawa, Ont.	April 6, '81	April 16, '08	O.L.S., S.L.S.
Stewart, Elihu	Collingwood, Ont.	Nov. 17, '44	April 14, '72	O.L.S.
Stewart, Lionel Douglas N	Fort Frances, Ont	Sept. 15, '83	Jan. 27, '10	O.L.S.
Stewart, Will Malcolm	Saskatoon, Sask	Nov. 26, '84	June 6, '07	S.L.S.
Stewart, Louis Beaufort	Toronto, Ont.	Jan. 27, '61	Nov. 22, '82	O.L.S., D.T.S. Professor of Surveying and Geodesy, University, of Toronto.
Stewart, Alexander George	Edmonton, Alta	Aug. 16, '87	Mar. 14, '10	A.L.S.
Stewart, Alexander Stanley	Lacombe, Alta.		June 13, '08	
Stewart, George Alexander			April 14, '72	O.L.S.
Stewart, Norman C.	Vancouver, B.C	Jan. 9, '85	Mar. 7, '12	B.C.L.S.
Stock, James Joseph	Ottawa, Ont.	Aug. 16, '87	Mar. 2, '10	
Street, Paul Bishop	Toronto, Ont.	Dec. 3, '81	Mar. 29, '10	
Stuart, Alexander Graham	Buckingham, P.Q.	July 16, '88	May 9, '11	
Summers, Gordon Foster	Haileybury, Ont.		Oct. 20, '10	O.L.S.
Swannell, Frank Cyril	Victoria, B.C.		May 10, '04	B.C.L.S.
Taggart, Charles Henry	Kamloops, B.C.	,83	May 9, '11	

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APPENDIX No. 9—*Concluded.*

LIST of Dominion Land Surveyors who are in possession of Standard Measures.—*Concluded.*

Name.	Address.	Date of Birth.	Date of Appointment or of Commission.	Remarks.
Talbot, Albert Charles	Calgary, Alta	April 5, '56	May 13, '80	A.L.S., Surveyor Land Titles Office.
Taylor, Alexander	Portage la Prairie, M	Aug. 6, '75	June 9, '04	M.L.S., S.L.S.
Taylor, William Emerson	Toronto, Ont.	Aug. 3, '81	Dec. 16, '10	O.L.S.
Teasdale, Charles Montgomery	Moosejaw, Sask.	Oct. 18, '79	Mar. 9, '06	S.L.S.
Thompson, William Thomas	Grenfell, Sask	Nov. 1, '53	Nov. 19, '77	D.T.S., S.L.S.
Tipper, George Adrian	Brantford, Ont.	July 25, '86	May 18, '11	A.L.S.
Townsend, David Thomas	Calgary, Alta.		Mar. 23, '07	O.L.S.
Tracy, Thomas Henry	Vancouver, B.C	June 25, '48	April 14, '72	O.L.S., B.C.L.S.
Tremblay, Ifred Joseph	Montmagny, P.Q.		Feb. 18, '90	
Tremblay, Albert Jacques	Edmonton, Alta.	July 25, '87	Mar. 1, '12	A.L.S.
Turnbull, Thomas	Winnipeg, Man	May 26, '57	Mar. 29, '82	O.L.S.
Tyrrell, James William	Hamilton, Ont.	May 10, '63	Feb. 16, '87	O.L.S.
Underwood, Joseph Edwin	Saskatoon, Sask	Nov. 3, '82	May 18, '11	S.L.S.
Van Skiver, Leighton A.	Fish Lake, Ont		'74 May 13, '13	
Vaughan, Josephus Wyatt	Vancouver, B.C	Oct. 17, '45	June 11, '78	B.C.L.S.
Vicars, John Richard Odlum	Kamloops, B.C.	April 16, '55	May 17, '86	O.L.S., B.C.L.S.
Vickers, Thomas Newell	N. Battleford, Sask.	April 19, '90	May 17, '12	S.L.S.
Von Edeskuty, Joseph Otto	Vancouver, B.C	Oct. 27, '84	Mar. 3, '13	
Waddell, William Henry	Edmonton, Alta.	Mar. 23, '83	Mar. 25, '07	O.L.S., A.L.S.
Waldron, John	Moosejaw, Sask.	Aug. 1, '72	April 2, '07	S.L.S.
Walker, Claude Melville	Guelph, Ont.	Oct. 16, '84	Mar. 11, '11	
Wallace, James Nevin	Calgary, Alta.	Aug. 21, '70	Feb. 20, '00	O.L.S, A.L.S.
Warren, James	Walkerton, Ont.	Nov. 7, '37	April 14, '72	O.L.S.
Warrington, George Albert	Winnipeg, Man		'83 Mar. 15, '13	M.L.S.
Watt, George Herbert	Ottawa, Ont.	Feb. 5, '76	Feb. 24, '02	T.S Branch Dept. of Interior.
Waugh, Bruce Wallace	Ottawa, Ont.	Mar. 24, '88	May 28, '12	
Weekes, Abel Seneca	Edmonton, Alta	Feb. 17, '66	Feb. 11, '92	A.L.S., S.L.S., O.L.S.
Weekes, Melville Bell	Regina, Sask.	Nov. 28, '74	Feb. 18, '03	O.L.S., S.L.S.
Wheeler, Arthur Oliver	Sidney, B.C.	May 1, '60	Nov. 21, '82	O.L.S., B.C.L.S. M.L.S., A.L.S.
White-Fraser, George W.R.M.	Victoria, B.C.		'61 Feb. 21, '88	D.T.S., B.C.L.S.
Wiggins, Thomas Henry	Saskatoon, Sask	Aug. 24, '63	Feb. 18, '96	O.L.S., S.L.S.
Wilkins, Frederick W. B.	Norwood, Ont	June 27, '54	May 18, '81	O.L.S., D.T.S.
Wilkinson, William Downing	Hamilton, Bermuda.	Mar. 22, '64	Feb. 22, '93	
Williams, Guy Lorne	Enderby, B.C	Mar. 3, '79	June 24, '08	B.C.L.S.
Wilson, Reginald Palliser	Winnipeg, Man.	July 9, '72	Jan. 26, '11	M.L.S.
Woods, Joseph Edward	Pincher Creek, Alta.	Oct. 13, '61	Nov. 14, '85	A.L.S.
Wrong, Frederick Hay	Windsor, Ont.	Aug. 22, '80	May 18, '11	
Young, St wart	Regina, Sask.	Sept. 2, '84	May 17, '13	S.L.S.
Young, Walter Beatty	Winnipeg, Man.	July 6, '80	Mar. 25, '05	M.L.S.
Young, William Howard	Calgary, Alta.	June 8, '78	May 17, '07	A.L.S. District Engineer.

Photo by F. V Seibert, D.L.S.

WRECK ON GRAND ISLAND TRAMWAY—ATHABASKA RIVER.

The mode of transportation on the Athabaska river is illustrated by this and the following views. Scows are built at Athabaska during the winter, loaded after the ice breaks up and floated down the river. Some of the rapids can be run without unloading, but at Grand Rapids it is necessary to unload. A tramway, 2,000 feet long, consisting of spruce stringers with a light iron band on top, was built on Grand Island in 1894 by the Hudson's Bay Company who charge $2.50 per ton of freight for the use of the two push cars. Accidents as shown are frequent although the company place a man on the island to keep the track in repair and collect dues

REPORTS OF SURVEYORS

SESSIONAL PAPER No. 25b

GENERAL REPORTS OF SURVEYORS

1914-1915

APPENDIX No. 10.

ABSTRACT OF THE REPORT OF J. R. AKINS, D.L.S.

SURVEY OF THE 29TH BASE LINE BETWEEN THE FIFTH AND SIXTH MERIDIANS.

The survey of the base line was begun at its intersection with the Fifth meridian, about sixty miles northeast of Red River settlement, and was continued westward striking the Sixth meridian about eighty miles northwest of Fort Vermilion.

I left Edmonton with my party on April 8, 1914, and travelled by the Edmonton, Dunvegan and British Columbia railway to the east end of Lesser Slave lake, where we arrived on the 10th. There by previous arrangement we were met by teams belonging to Revillon Bros., and the outfit was taken over the ice on Lesser Slave lake to Grouard.

From there on to Peace River Crossing the trail was reported to be so bad that we had difficulty in securing teams for transportation. However a sufficient number were finally secured, and, although we found the trail in worse condition than was anticipated, we were able to reach the Crossing on April 20.

At this place we found the river open, but as drift ice was still running we were delayed a few days.

Scows, carrying about twelve tons each, which had been ordered the previous fall, were loaded on April 24, and the trip down the river was begun the following day. At Fort Vermilion, which was reached on the 30th, we were still further delayed by the drift ice, the river at this point having broken up only the day before.

The trip down Peace river was continued on May 2, and Vermilion rapids, fifty miles below Fort Vermilion, were reached the following day. These rapids extend over a distance of about thirty chains. Below this the water is smooth as far as Vermilion "chutes," a distance of three or four miles, where a drop of ten or twelve feet occurs. A party was employed during the summer of 1914 in surveying a route for a tramway around these "chutes." If this tramway and the railway to Peace River Crossing were completed all the freight for the Mackenzie basin would go down Peace river.

We experienced a great deal of difficulty at the 'chutes,' as the channel close to the south shore, where scows are usually let down with ropes, was jammed full of ice, reaching in places a height of thirty feet; we finally succeeded in forcing a passage near the north bank of the river. The scows were unloaded and run down empty, the loads being portaged both at the rapids and at the "chutes."

We reached Red River settlement on May 8, and the point where Peace river crosses the Fifth meridian on the following day. From this place a trail was cut a distance of fifteen miles to our starting point on the 29th base line. Work on the line was begun on May 16.

In range 4 Deer river was crossed. South and east of this river as far as the Peace the soil is good, the surface being gently rolling and wooded with poplar and spruce. West of the river the country rises quickly towards Caribou mountains, the summit being reached in range 5. The slope is heavily wooded with spruce and jack-pine up to twelve inches in diameter, and the top lightly wooded with stunted spruce and covered with moss. The frost remains in the ground throughout the year, the

surface moss thawing only to a depth of about six inches. The roots of the trees do not grow deep into the ground, and are very easily pulled out during the warm weather.

Caribou mountains are of little value except as a game preserve, but if the surface moss were burned off they might produce good grazing, as bunch grass was found where a fire ran two years ago. A number of lakes are found on the plateau-like top of the mountains, but no grass grows around them as the moss extends right to the water's edge.

The part of the mountain crossed by the base line appears to be of moraine formation, as no exposures of rock were seen. The banks of the river and streams are composed of clay and gravel, and the beds are full of boulders of an igneous character. These boulders probably had their origin in the igneous rocks east of Great Slave lake, and were transported to their present location by the great glacier which came from the northeast and whose action is plainly seen in the striated rocks east of Slave river. As the Caribou mountains form quite a large physical feature, it is not likely that they were entirely formed by a moraine. Originally there may have been an elevation which interfered with the flow of the glacier and caused the deposits. The rocks under the clay and boulders are probably Devonian limestone.

After running along the top of the mountains for about forty miles, the base line begins to descend about the middle of range 11, where it crosses Carl creek. As this district has been overrun by fire,, wild rye grass grows in abundance, and furnished the first horse feed found after leaving range 5.

The mountains run northwesterly from Carl creek, and the district to the south and west is nearly level or gently rolling. This district was formerly well wooded, but was overrun with fire as far as the middle of range 17; it is now covered with grass and the soil is good.

Boyer river in range 13, is about one hundred and sixty feet wide, two to four feet deep and flows five miles an hour. It has very deep cut banks; the valley is about sixty chains wide.

From range 17 to range 21 the line runs through light timber which is of small value, except for settlers' use. The trail from Hay River trading post to Fort Vermilion crosses the line in range 21. South of the base line to Fort Vermilion the trail is good, but towards Hay river it is very stony.

The district crossed by the line from Hay River trail to the Sixth meridian is lightly wooded with poplar, willow and spruce, with plenty of horse feed.

The Sixth meridian was reached on September 17, and the following day the party left for Fort Vermilion, where we arrived in time to catch the last boat to Peace River Crossing.

In the Caribou mountains bears and caribou abound. A few moose were seen on the lower country, but they are not plentiful. Feathered game is scarce owing to the presence of so many of the fur-bearing animals that prey upon them, such as foxes, mink, marten, fisher, otter and ermine. Beavers are not plentiful though some were seen.

The lakes on the mountains abound with fish, but the fishing industry is neglected, as hunting and trapping is more lucrative. For the same reason the cultivation of the valuable land around Fort Vermilion is neglected.

Fort Vermilion can be reached from Peace River Crossing by boat or raft, down Peace river, or by a pack-trail which runs to the west of the river, crosses Notikewin, Keg, Prairie and Boyer rivers and passes near Bear lake. The trail is not very good in places and does not follow the river, being sometimes forty miles from it. The trip from Peace River Crossing to Fort Vermilion by trail would require about ten days for a man on horseback.

A wagon road in the vicinity of the pack-trail would greatly aid the development of the country as nearly all the land in the valley of Peace and Hay rivers is well suited for farming, and can be easily cleared.

APPENDIX No. 11.

ABSTRACT OF THE REPORT OF C. F. AYLSWORTH, D.L.S.

RESURVEYS IN MANITOBA.

On May 13 I arrived with my party in tp. 23-5-Pr., where we commenced work for the season; a resurvey was made of that portion of the township around Birch lake. We found this township well settled.

Our next work lay in tp. 22-3-Pr. In this township there is some good timber, and settlers come from as far south as Lake Francis, in tp. 15-3 Pr., to secure building material. Fire has destroyed a large amount of timber and much of the alluvial soil.

On July 23, having completed the work in tp. 22-3-Pr., we moved to Vannes and thence to tp. 20-4-Pr. to traverse a lake in section 4. We then left via Eriksdale for Lac du Bonnet, following a corduroy road along the City of Winnipeg Electric Power line and reaching there on August 10.

Our next work consisted of the resurvey of part of tp. 14-11-E. On the east side of Winnipeg river, which runs through the township, there is a strip of dry land about half a mile wide. East of this lies an impassable tamarack muskeg from which nearly all the merchantable timber has been removed.

Winnipeg river in this township, is about a quarter of a mile wide, with banks about forty feet high; the bed of the river is solid rock covered with boulders, rendering navigation dangerous. Whitemouth river flows into the Winnipeg just north of a waterfall, which occurs in the river south of the south boundary of the township. A natural rock dam which has to be portaged lies across Whitemouth river at its outlet. After traversing both banks of Winnipeg river we left for tp. 12-10-E., arriving there on October 8.

This is a very inferior township for agricultural purposes, as the soil is poor and stony and there are a great many muskegs. It is, nevertheless, being rapidly settled by Galicians.

On November 2, I closed operations for the season and returned to Winnipeg.

APPENDIX No. 12.

ABSTRACT OF THE REPORT OF M. H. BAKER, D.L.S.

RETRACEMENT IN SOUTHERN ALBERTA.

During the first part of the season I was engaged on road surveys in Yoho and Rocky Mountain parks, and later on miscellaneous surveys in southern Saskatchewan and Alberta.

My first work was taking levels on the road from Field to Emerald lake, and on the branch of this road running to the natural bridge. I also surveyed the road from Field up the Yoho valley as far as it was constructed, and the road from Field to Ottertail.

This latter road follows the abandoned grade of the Canadian Pacific railway to within about one mile of Ottertail. From there a new road will have to be constructed.

The road from Field to Hector was surveyed from its junction with the Yoho valley road to where it strikes the old railway grade and thence along the grade far enough to tie to the Dominion Lands system.

In the survey of these roads levels were taken and a traverse made in each case, iron posts being planted at the traverse stations.

The next work was a survey of a lot in tp. 28-18-5, and a restoration survey of the cemetery at Field, B.C.

Completing this work on July 28 I left for Lake Louise to make a survey of the roads from the railway station to Chateau Lake Louise and also to Moraine lake.

The miscellaneous surveys in southern Alberta were commenced on August 20, the first work being the retracement of coal claims in tp. 19-4-5. Crops in the district east of this township were good and the settlers appeared to be prosperous. From Lineham in tp. 19-3-5 westward the country becomes rough, and ranching is followed. In tp. 19-4-5 the surface is heavily timbered. In ranges 2 and 3 oil-derricks were seen, and for miles in every direction the country is staked with oil claims. The coal claims are located in the valley of the south branch of Sheep river in very hilly and wooded country. The seams of coal found appear to be of excellent quality.

On September 1, I moved to tp. 19-7-5 to survey the north boundary of section 4 and the east boundary of section 8. In the latter section valuable coal seams were noticed, and coal companies have erected buildings in connection with mining operations.

After making a small restoration survey in tp. 16-4-5 I went to Wymark, Sask., to erect some monuments in that townsite. The town is newly built and some of the buildings are of a very good type. This season, however, has not been favourable to the surrounding country and the town has received a set-back in consequence.

I next went to tp. 1-4-4 to make a traverse of Milk river in section 6, but on reaching there I found that the river had changed its course southerly, and now flows south of the international boundary so that no traverse was required.

The district around Castor, Alberta, where my next work was located, bears the appearance of prosperity. Crops were excellent, and thousands of tons of hay were stacked throughout the district.

North of Medicine Hat, where I also made some miscellaneous resurveys, the crops were a failure owing to lack of moisture. This district seems best suited for ranching and it is to be regretted that farmers are settling there. They cannot be successful themselves, and their coming interferes with the ranching industry.

I closed the season's work and left for home on December 17.

APPENDIX No. 13.

ABSTRACT OF THE REPORT OF P. R. A. BELANGER, D.L.S.

INSPECTION OF CONTRACTS IN NORTHERN ALBERTA.

After organizing at Edmonton the party left on April 8, 1914, for Atikamisis Lake settlement in tp. 8-11-5 where our first work was situated, travelling to Sawridge on the Edmonton, Dunvegan and British Columbia railway and thence by trail to our destination. The subdivision in tps. 80-11-5 and 80-12-5, the survey of the settlement and the running of tie lines to connect Indian reserves Nos. 155-A and 155-B with the 21st base line kept us busy until July 31 so that I was unable to begin inspection work until August 1.

A wagon road from Grouard leads in almost a direct line to Atikamisis Lake. The settlement consists of sixteen lots varying in size from twelve to eighty acres each. Fishing and trapping form the chief industries of the half-breed settlers at this place. The only cultivation of the land consists of a little gardening, with the exception of a small portion near the lake front. The settlement is well timbered. When cleared the land will produce all kinds of cereals and vegetables.

The first inspection work was in contract No. 12 of 1914, about fifteen miles north of Grouard. The trails from Grouard to Atikamisis Lake and from Grouard to Peace River Crossing, both cross this contract. The whole surface is timbered except a small belt of open land near the main trails where there are some good homesteads.

Our next work was in contract No. 6 of 1913, on the south shore of Lesser Slave lake. This contract is crossed by the Edmonton Dunvegan and British Columbia railway. The surface is covered with bush and although the land is suitable for farming purposes it needs considerable clearing. The townships in contract No. 4 of 1913, which was next inspected and which lies on the north side of the lake, are similar to those in contract No. 6. A road, a very rough one, along the north shore of the lake gives access to this district.

Contracts Nos. 8, 10, 11 of 1914, and contract No. 19 of 1913 were next inspected. These contracts all lie west and northwest of Winagami and Round lakes. The soil in this area is good but the land is covered with bush consisting of green and fire-killed spruce and poplar. Trails made by the surveyors run in all directions through the district. Homesteads will likely be taken up there as soon as the Edmonton, Dunvegan and British Columbia railway is in operation to Round lake at which point the road branches, one line going to Peace River Crossing and the other west towards Spirit River and Pouce Coupé settlements.

From Round lake district we returned to Grouard for supplies and then proceeded to contracts Nos. 5, 6 and 7 of 1914, north of Sturgeon lake. The surface in this district is generally rolling and is broken by several deep ravines near Little Smoky river. The land is mostly timbered except for a stretch of brulé in township 73 across ranges 22 and 23 where there are some good quarter-sections which do not require much clearing. West of Snipe lake there is a stretch of burnt country where hay grows luxuriantly, affording an ideal grazing district.

Our last work for the season was the inspection of contract No. 15 of 1914 in the vicinity of Wabiskaw lake. To reach this work we returned from Grouard by rail to Edmonton, thence to Athabaska and from there by trail to Wabiskaw lake. The land

in this contract is rolling and is mostly heavily timbered with poplar and scattered spruce, but large areas of good hay land are found in most of the townships The district is well adapted for mixed farming but the difficulty of access is the great drawback. At present it is reached by a pack-trail from Athabaska, a distance of about 125 miles. It can also be reached by a summer pack-trail from Sawridge and this trail could be converted into a good wagon road with small expense. Such a road would furnish good communication with the railway, promote the fishing industry of the Wabiskaw lakes and attract homesteaders to a fertile area.

Having completed this inspection I closed operations on January 16, 1915, and left for Edmonton.

APPENDIX No. 14.

ABSTRACT OF THE REPORT OF G. A. BENNETT, D.L.S.

STADIA SURVEYS IN WESTERN SASKATCHEWAN.

During most of the season my work consisted of the investigation of water areas in western Saskatchewan. Bodies of water recorded by previous surveys were examined and a stadia survey made of their present boundaries. A careful exploration of the country was also made for lakes not recorded on previous surveys. In the hills, this necessitated the examination of almost every quarter-section.

My first work was in the vicinity of tp. 35-15-3; many alkaline lakes were found in this district. The country is rolling to hilly prairie with patches of willow brush. Almost all the land has been homesteaded and the settlers appear fairly prosperous. Some of the land is too light for grain growing, and so the greater part of the income of the farmers is derived from dairying.

We next made an investigation and the necessary surveys in townships 27 to 30, ranges 24 to 29 inclusive, west of the Third meridian. Also tp. 29-1-4 and tp. 28-3-4 were fully investigated and surveyed.

These townships are composed of rolling to hilly prairie. The land has practically all been taken up, and about twenty-five per cent is under cultivation. The homesteaders are gradually working into mixed farming and now supply the local demand for eggs and dairy products. The hot winds and drought very nearly destroyed the grain crops this year throughout this district.

A number of townships in the vicinity of Tramping lake, were next explored and surveyed. There almost all the marshes, sloughs and lakes, which existed at the time of the original survey, were found to have dried up. White Heron lake in tp. 34-22-3 may be specially mentioned as an example of the changing topography. This lake which covered an area of 820 acres when first surveyed was found to be absolutely dry. The settlers had a fine road graded across the centre of the old lake bed, and homesteaders were applying to be allowed to go upon the dry bottom to try farming it.

A gradual improvement in the crops was noted as we carried our investigation north. Around Tramping lake good yields of wheat and fair crops of oats were harvested.

I closed my stadia surveys on October 15, stored the outfit and accompanied only by my assistant, I proceeded to Alberta to make some small miscellaneous surveys. Our first work of this kind was in a group of ten townships around Sullivan and Bowling lakes, southeast of Stettler.

This district has been homesteaded during the last few years and the settlers are successfully engaged in mixed farming, and already they have fine houses and commodious barns. Vast quantities of hay are cut every year by the homesteaders in the marshes around the numerous lakes and sold to the large ranchers to winter their thousands of cattle for which there is not now sufficient winter pasture. Ducks and geese were noticed in great numbers on the lakes, and prairie-chickens were fairly plentiful.

On November 12, I proceeded to Innisfail to investigate the survey of the 9th correction line across ranges 28 and 29 west of the Fourth meridian. On making a retracement survey I found that errors in the survey of the south side of the correction line had closed the road entirely in some places. The settlers of the vicinity

were most pleased to find that steps were being taken towards opening up this road, which they desire to grade and make their principal road to town. This district has been settled many years and the farmers are now well-to-do.

Retracement surveys were next made in tp. 37-25-4. This township is very hilly and covered in parts with heavy scrub willow, yet it has been homesteaded and the settlers are engaged in dairying.

I then surveyed a small lake in tp. 55-24-4, which had dried up considerably since the previous survey.

The retracement required to correct the records with reference to the position of a witness monument in tp. 42-28-4 completed the surveys for which I had received instructions. I therefore closed operations and reached home on December 3.

APPENDIX No. 15.

ABSTRACT OF THE REPORT OF G. H. BLANCHET, D.L.S.

SURVEY OF PARTS OF THE 24TH AND 25TH BASE LINES, WEST OF THE FOURTH MERIDIAN, NORTHERN ALBERTA.

On May 1, 1914, I left Athabaska with my party and outfit, loaded on three scows, and proceeded down the river to McMurray, arriving there on the 11th. At this point the horses, which had been sent overland via Lac la Biche, were loaded on the scows. The following day we reached McKay, where we cached supplies to be used on the survey of the 24th base line. We then floated down to Tar river and landed the remainder of the outfit.

A pack-trail was opened up along Tar river to its intersection with the 25th base line (north of township 96) at the westerly side of range 12, which was the starting point of our survey. We reached there on May 18 and the following day after retracing a portion of range 12, the production of the line westerly was begun.

From Athabaska river, which crosses the line in range 10, westerly towards Birch mountains, the country rises steadily, the ascent becoming marked in range 13, at the westerly side of which the summit of the southeasterly spur is reached. The easterly ascent has for the most part escaped fires and is covered with a fairly heavy growth of poplar, spruce and jackpine, and is well drained.

Birch mountains is the name applied to an extensive elevated area occupying most of the country lying between Athabaska and Wabiskaw rivers and having for its approximate south boundary a line joining the mouth of Calumet river and Chipewyan lake. The boundaries of this area are very irregular and its surface varies greatly in roughness and in the direction of its ridges. A marked feature of this area is the accumulation of boulders at the surface, indicating its probable origin as glacial. The rolling nature of its surface gives it in general a fair drainage. In range 14 Joslyn creek is crossed, flowing through a wide deep valley. It emerges from the hills a short distance to the south and flows through an undulating country enriched by the alluvium from the hills, and which in general is fairly well timbered with poplar and small areas of spruce. North of the line along Joslyn creek the country is rough, hilly and for the most part burnt over.

In range 15 the country draining into Namur river is entered, the streams flowing southwesterly. Namur river crosses the line near the middle of range 16, and is the largest stream in that part of the country. It has its principal source in the lake of the same name which is crossed by the line at the end of the next range. Another fairly large branch of it rises to the northeast near the Athabaska. It continues south and a little westerly to the correction line and then swings in a northeasterly direction to Athabaska river. The country along this river where it runs through the hills has not much agricultural value, but along its lower course there are considerable tracts of good poplar lands. This river with its tributary streams forms the main drainage of the country extending from the 26th base south to the correction line between the 24th and 25th base lines, and from Athabaska river westward to range 19. Namur lake, the southerly end of which is crossed by the base line in the westerly side of range 17, is about seven miles long and from one to two miles wide and is surrounded by high lands. It contains several islands and has a gravel bottom. Fish abound in this lake. There is a possible canoe route from it to the Athabaska.

After leaving Namur lake a well-pronounced divide having a northeasterly and southwesterly course was crossed. This ridge, on which the maximum elevation in this part of the country is reached, forms in general the "height of land," although there are several cases where drainage passes around it. The line descends abruptly in the westerly part of range 18 to Legend lake, so called from the superstitious dread the Indians have of it on account of monsters supposed to inhabit it. This lake is about nine miles long and varies in width from one and a half to three miles, the base line crossing at its southerly end. It forms one of the principal sources of Birch river. Here also fish are abundant, and in the surrounding hills are many moose and caribou.

Westward from Legend lake the line enters a moderately rolling country of fairly high altitude, which is dotted with small lakes draining through small sluggish creeks to the north, and there uniting to form Mikkwa river. From range 20 Mikkwa river occupies a well-defined valley near the 25th correction line, the hills north of it forming the divide between it and Birch river. The base line follows the high land to the south which divides its drainage from that of Liége river. Thus it can be seen that in the neighbourhood of the 25th base line in ranges 18 to 20 five large streams have their sources, namely: Namur, Birch, Mikkwa, Liége and Dunkirk rivers. Birch mountain plateau, except along its borders or large valleys, contains large areas of muskeg, and the soil on the ridges is light and contains many boulders. Little merchantable timber remains.

While extending the line across range 21 a fire got into our cache, destroying most of our supplies and making it necessary to move back about eighty miles to our supply depot at McKay, which we reached on July 13. It was decided to leave the remainder of the 25th base line till after the 24th was completed and then return to it from the west. While at McKay some of the men left, and it was over a month before the party was made up to full strength again.

We travelled from McKay by an old Indian trail, to its intersection with the 24th base (north of township 92) at the east side of range 11, and moved along the line to the end of this range where our work began. Heavy rains during the next few weeks hindered the work considerably. An attempt was made to move a cache up McKay river which crosses the line at the east side of range 12, but it was found too crooked and after the first few miles too much broken by rapids.

McKay river drains the country south of the Namur and north of Thickwood hills, and has a drainage area of roughly sixty miles by thirty. The river enters the Athabaska about eight miles north of the line in range 11. It flows in a deep narrow valley with limestone outcrops in many places. Above these outcrops are extensive beds of tar sands whose richness is shown by tar springs at several points. About eight miles up-stream Dover river comes in from the north. After crossing the line in range 12 McKay river swings westerly to range 16 where it is about eight miles south of the line. Here it forks, the main river turning south while a large branch called Dunkirk river comes in from the northwest. This crosses the line in range 18 and again forks, both branches rising in the Birch hills to the north. The country adjacent to McKay river and its branches, except in their headwaters, is for the most part well timbered with poplar, spruce and jackpine. Small water-powers could be developed easily and cheaply at many points. Much of the country lying between the different branches is of fair agricultural quality.

From range 17 to range 20 the line ran through a very level stretch of country in which the drainage is sluggish and consequently, the country is practically all muskeg extending north to the Birch hills and to the south forming part of the great interior muskeg.

At the westerly side of range 20 the line ascends the southwesterly extension of Birch hills and continues on this elevated area to the meridian. The surface varies from rolling to rough and much of it has been fairly cleanly burnt over, but to the north

the country is more timbered. Numerous fairly large creeks rise in the hills to the north and flow southwesterly into Wabiskaw river. There as elsewhere, on the Birch hills the surface is thickly strewn with boulders, and the soil is inclined to be light. The principal stream flowing through this portion of the country is that called Liége river which drains the country south of the Mikkwa and west of McKay river.

The Fifth meridian was reached on October 7.

We still had twenty-one miles of the 25th base line to complete so proceeded by way of the Burnt lake trail to its intersection with the Fifth meridian and thence along the meridian trail to the northeast corner of tp. 96-1-5, whence we opened up a trail easterly to near where work had been abandoned. Most of this travel was over bad muskeg and as the horses were loaded heavily and feed poor and scarce, the trip tried them severely, playing out the older and poorer ones completely.

The work of completing the line proceeded rapidly. The country passed through by the line was that adjacent to the divide between Mikkwa and Liège rivers; although of high altitude and rolling, it was principally muskeg in which the feeders of both streams have their rise. This portion of the country at one time supported a heavy growth of timber in places, but this has been almost completely burned off and is replaced by a thick second-growth of spruce and jackpine.

The line was completed to the Fifth meridian on October 29 and on the following day we started for Edmonton, travelling by Wabiskaw river trail to Wabiskaw and thence by the mail route to Sawridge. The contractors of the Edmonton, Dunvegan and British Columbia railway were operating a passenger service to Edmonton and we were able therefore to travel the remainder of the distance by train.

We reached Edmonton on November 21 and the party was disbanded the same day.

APPENDIX No. 16.

ABSTRACT OF THE REPORT OF E. P. BOWMAN, D.L.S.

STADIA SURVEYS IN SASKATCHEWAN.

The work on which I was engaged during the season of 1914 consisted of an investigation of all water areas in certain townships which had been subdivided a number of years ago, and the survey by stadia of all water areas over five acres in extent which appeared to be permanent.

It has been found that in some cases these water areas have changed considerably since the time of the original survey, especially in prairie country, where many of the lakes previously traversed have either dried up entirely or dry up during the summer, thus rendering new areas suitable for agricultural purposes. In bush country, however, the reverse is often found to be the case, new lakes, missed in the original survey, being found. These cause complaints from the settlers, when they find that parts of their homesteads are useless for farming because of previously unsurveyed bodies of water.

In addition to the investigation of water areas, considerable retracement work was done, monuments being erected at section and quarter-section corners where bodies of water, which prevented the erection of monuments at the time of the original survey, have dried up.

My first work was to complete the investigation of water areas in townships 37 to 40, inclusive, ranges 14 to 17, inclusive, west of the Third meridian. I also included tp. 40-18-3 in my work in this district.

The general nature of this block of townships is fairly uniform with the exception of tps. 39 and 40-14-3, and the north part of tp. 40-15-3, which are mostly bush country and have some deep permanent bodies of water. Throughout the greater part of the district the lakes seem to be gradually drying up, although there are a few exceptions. Most of them are quite shallow, containing chiefly alkaline water, some with very soft, and others with fairly solid beds. Nearly all small marshes shown formerly on the township plans at section and quarter-section corners had dried up, allowing the erection of monuments. The surface varies from undulating to rolling and occasionally hilly prairie. Practically all available good land has been taken up. In some townships lands are nearly all patented, while in other townships they are in the earlier stages of homesteading. Settlement is well advanced in some parts and in other parts very little settlement has taken place. Patented lands do not always indicate well settled country, as these lands are often held by the railway companies or by private individuals, who have secured their patents and left their lands, and thus quite frequently a district in which homestead duties are being carried on presents a better settled appearance than those where lands are all patented. Grain growing is the main industry pursued by the farmers and gives good success, although mixed farming is followed in parts more remote from the railways and where hilly or stony land is found. The latter method seems to be gaining in favour among the settlers. Graded roads are being constructed in most of the townships along the road allowances, and where these are not built good trails are generally found. Water is obtained by digging or drilling to a depth of from fifty to one hundred and twenty-five feet. Fuel is obtained by teaming from the forest reserve in tp. 40-14-3, although coal is used by some. The Battleford-Biggar branch of the Grand Trunk Pacific railway has been a great help in the development of this district.

In addition to the investigation and traverses of lakes in this block of townships, seventy-three section and quarter-section corners were established, necessitating the retracement of about eighty-six miles of section lines.

Crops in this district were rather light in some parts, due to dry weather in the early part of the summer.

The work in this district was completed on September 8. I then moved north to investigate townships 52 in ranges 22, 23 and 24. During this move, we passed through the Cutknife district, where the crops were exceptionally good, not having had as much dry weather as other districts farther south where crops were very poor. We also passed through Paynton, crossing the ferry on Saskatchewan river north of Paynton, and continued north till we reached the old Fort Pitt-Battleford trail, which we followed northwesterly to tp. 52-24-3. Considerable very sandy land lies along this old trail, soft drifting sands occurring in many places, thus making transportation of heavy loads very difficult. Very little settlement was found along this part of the trail, the soil probably being too light for farming.

Work was begun in these townships on September 15. They are mostly well settled, most of the settlers being engaged in mixed farming and stock raising, for which the townships are well suited.

I closed operations on October 15 and returned to Battleford on the 16th.

In connection with the condition of water areas this year, the early part of the season was dry and hot, and the water was said to be lower in the prairie district than it usually is. In the country north of Saskatchewan river, particularly the last two townships surveyed, the water was higher than usual, due to heavy rains in August and September. Many of the hay sloughs cut for hay during the summer had a few inches of water in them at time of survey. Englishman river was also said to be much higher than it had been earlier in the season.

In the last three townships surveyed, six section and quarter-section corners were established and six miles of section line were retraced.

The absence of railways in the proximity of these townships is rather a drawback, but the construction of the Edam branch of the Canadian Northern railway through to Turtleford, to which place trains now run, improves conditions.

On our return to Battleford we travelled by way of the old Fort Pitt-Battleford trail, although the road allowances have to be followed the greater part of the way. Very fine farming country lies along the line of the Canadian Northern railway at Edam and other points along the line to Battleford.

APPENDIX No. 17.

ABSTRACT OF THE REPORT OF W. J. BOULTON, D.L.S.

STADIA SURVEYS IN SOUTHERN ALBERTA.

The work on which I was engaged during the past season consisted of the survey of lakes in southern Alberta, my first work being the survey of a lake which crosses the base line between tps. 8 and 9-18-4. This lake is evidently much larger in area than when originally surveyed, due to the fact that it is being used as a reservoir by the Irrigation department of the Canadian Pacific Railway company. The fluctuation in depth is very moderate, and does not materially affect the area of the lake surface. The water is clear and drinkable, but is cumbered with weeds near the shore. The confines of the lake are hills, ranging in height from seventy-five to one hundred and twenty-five feet, the crest averaging a distance of two hundred feet from the water-line.

I then surveyed the portion of a lake lying in township 8, range 18, and those parts of Reservoir, and Chin Coulee lakes in township 9. The area extending for two or three miles on either side of Chin coulée is not settled upon.

On June 29 I moved to range 15, and proceeded with the investigation of townships 9 and 10, which I found to be fairly well settled. An artesian well was found on section 9, in township 10. Townships 7 and 8 are sparsely settled and are chiefly used for sheep grazing.

On July 4, I moved into range 16, and commenced operations in township 7. A large lake extends from section 26 in range 16 to section 36 in range 17. This lake is now an abandoned irrigation reservoir, the course of the water having been diverted in another direction. The lake at present has no inlet or outlet, but is fed to a certain extent by springs. The water is gradually receding, but the rate of recession is so small that the lake may be considered as permanent in character. The shore-line is quite definite and stony, and the immediate confines quite steep.

This lake, as is the case of the other lakes in Chin coulée, provides a means for the farmers in the district to water their stock, and in fact, renders it possible for them to engage in the stock-raising industry.

There is no doubt that the district to the east, up the coulée, in township 7, range 15, could be rendered useful for stock raising by raising the elevation of the lake just mentioned, about six feet, and constructing a small ditch between that lake and the low-lying land immediately to the east. This would create another large lake in the coulée, and enable the few farmers, already in the district, to have a much shorter water haul, and would ultimately induce others to come into the district and raise stock.

I next investigated tps. 7, 8 and 9-17-4 and tps. 8 and 9-16-4. I first finished the survey of the lake which I had started, while investigating tp. 8-18-4, and which I found to extend into range 17, running southeasterly from section 19 to section 2, thence into section 35, tp. 7-17-4. At the eastern end of this lake is found the immediate source of water supply in the form of an irrigation canal conveying the water from St. Mary's river. These townships are fairly well settled, and a goodly portion is under cultivation.

On July 28, I proceeded to township 9, range 19, from which I thoroughly investigated townships 8 and 9 and parts of townships 7 and 10.

Photo by F. V. Seibert, D.L.S.

SHOOTING GRAND RAPIDS—ATHABASKA RIVER.

After unloading at the head of Grand Island, the scow is taken back to the right-hand channel, and run through to the eddy below the foot of the island. At low water this is a very difficult undertaking for the channel is, in many places, just wide enough for a scow to pass, and the current is so swift that it leaves a very small margin of control of the scow by the crew. Only a few of the best river men will undertake this, and then only with the very best crew.

Photo by F. V. Seibert, D.L.S.

STUCK ON A ROCK IN GRAND RAPIDS—ATHABASKA RIVER.

At low water, this rock is in the middle of the channel and impossible to avoid. Fortunately it is round and smooth and seldom does damage to the scow. Sometimes the scow slips over without stopping, but when it stops, it must be kept heading down stream. In the view, a pole against the port bow keeps it from swinging. Should the scow swing, the chance of saving it from being broken to pieces is small.

In township 9 I found the areas of four lakes to be considerably augmented, as they are being used as irrigation reservoirs. Generally speaking, these lakes are very shallow, with a more or less indefinite shore-line, and are much overgrown with weeds. The areas are subject to slight variations, depending entirely upon the amount of water used or wasted in irrigating the district.

The southerly part of township 9 and the northerly part of township 8, have been thoroughly irrigated, and some excellent crops of alfalfa, clover and potatoes were grown during the season. Excellent grazing is found in these townships, and many farmers, engaged in mixed farming, are making substantial profits.

On August 19, having ascertained that Belly river was normal, I decided to prosecute my investigations in the townships traversed by this stream. Consequently I moved north and commenced operations in sec. 36, tp. 10-19-4 and gradually worked east across tp. 10-18-4 and tp. 10-17-4, thence north through tps. 10, 11 and 12-16-4, finishing up on the E. By, sec. 13, tp. 11-16-4, which was the easterly limit of my district. About the time I completed this work, the district was visited by an extremely heavy and wet snowstorm, which continued intermittently for about ten days. In the meantime, I moved through almost impassable roads to tp. 10-19-4 and succeeded in completing the survey of Belly river in this township and in township 11, range 18, on October 14.

The course of Belly river is very winding and many nice flats are available on the convex sides of the bends, while the concave sides are generally cut banks about seventy-five feet high.

The river is not so wide as it was at the time of the original survey, due no doubt to the immense amount of water now being diverted through irrigation canals leading from St. Mary's river. Consequently there is considerable forest growth to be found on what were once termed "sand-bars."

The maximum flow usually occurs in June or July, and the minimum in January or February, the difference in the height of the water, being ordinarily, about five or six feet.

There is plenty of good household coal to be found along the valley of Belly river, the seams being plainly evident in the cut banks. They vary from two to five feet in width.

Work on Belly river was impeded at times by the presence of rattlesnakes. Fortunately none of the party were bitten, although we managed to kill twenty-five of the reptiles.

On October 14, I moved to Coaldale, a small town on the Crowsnest branch of the Canadian Pacific railway, and intended to complete the investigations which I had begun in tps. 8 and 9-20-4, and tp. 7-19-4, but the country, especially in the central part of tp. 9-20-4, was completely inundated by the over-supply of irrigation water, which seems to be very poorly controlled.

Some parts of the townships in the district showed signs of there having been lakes at one time, but it is so long since, that the vegetation in these low-lying parts is on a par with that of the surrounding country.

The district is, generally speaking, more or less settled upon, and considerable land has been broken and once cultivated, but during the past few years, the precipitation has been so slight that much of the land is being allowed to return to its original prairie state, and many places are being abandoned.

Scarcity of water seems to be the chief drawback to this district. When properly irrigated, however, the soil, which is generally of a light sandy nature appears to be very productive. The Irrigation department of the Canadian Pacific Railway company had, during this season, four parties of engineers making preliminary investigations in this district, with a view to ultimately constructing irrigation canals and dependent laterals. In the event of this work being done, this district will prove to be one of the most productive in the province of Alberta.

The trails, throughout the entire district are first-class and are, in general, confined to the regular road allowances.

Shipping facilities are of the best as the Crowsnest branch of the Canadian Pacific railway passes east and west through the centre of the district, and along it there are elevators erected every six or seven miles. Another branch of this railway, which will be known as the Lethbridge-Weyburn line and which follows approximately the 2nd correction line, is being constructed through the district.

The whole district seems to be underlaid with coal, and it is being mined extensively in the vicinities of Lethbridge and Taber.

Many ducks and geese were seen around the lakes in Chin coulee, especially those in tp. 9-10-4 which are veritable duck ponds. Many antelope were also seen along Belly river.

In eleven of the townships, which I investigated, I found no water areas at all.

I closed operations and paid off my party on October 17.

APPENDIX No. 18.

ABSTRACT OF THE REPORT OF L. BRENOT, D.L.S.

SUBDIVISION IN PEACE RIVER DISTRICT.

My survey work during the summers of 1913 and 1914 and the intervening winter consisted chiefly of the subdivision of lands suitable for settlement along the Peace river valley between Fort St. John and Hudson Hope.

Most of the fertile land in this district lies on the north side of Peace river, the land south of the river having been so often overrun by fire that it is almost sterile. The areas surveyed on the north side of the river are easy of access, and consist mostly of flats and bench land in the river valley. The notable exceptions are a plateau north of Fort St. John and an area in tps. 83 and 84-20-5 known locally as "Jim Rose prairie." The bench land and flats are backed by hills from 700 to 1,100 feet high, and the steep slopes of the hills are covered with luxuriant grass which appears early in spring, before the snow has disappeared from the valleys. These grassy slopes will furnish admirable ranches for stock from the farms situated on the benches and flats.

The good land in the flats is covered with small poplar which will have to be cleared and this may prevent the early settlement of the district. Settlers are located on Halfway flats in tp. 83-22-6, on Cache creek flats in tp. 84-21-6 and on South Pine flats in tp. 83-18-6. We subdivided the land at all of these points. South Pine flats, though not of great extent, encroach on four townships, and over eighty miles of outline had to be run before making the subdivision.

While in that vicinity we ran the boundaries of timber berth No. 2052, in townships 80 and 81 ranges 15 and 16. This work carried us late into the fall, and as the ice was commencing to run in the river, we abandoned subdivision work in that vicinity and left for Hudson Hope.

As soon as the river had frozen over I subdivided part of tp. 82-25-6. I then cut a trail to Moberley lake district and performed the subdivision necessary in tps. 79 and 80-24-6; the trail cutting was rendered very difficult by the dense undergrowth.

Having finished this work, I returned to Hudson Hope and resurveyed the Hudson's Bay company's reserve there. I then divided the party, sending four men and one assistant to level the west boundary of Peace River block between the 21st and 22nd base lines, and with the remainder of the party I proceeded to survey a number of township outlines and subdivide the land suitable for settlement in tp. 82-24-6.

When the levelling and subdivision were completed we built a raft and floated the outfit down Peace river to Fort St. John. While on the raft I took soundings of the river and found the average depth in mid-channel to be about ten feet, though in places it was only five feet. The current runs from three to five miles per hour and the width of the river ranges from twenty chains to one mile.

At Fort St. John we surveyed two Hudson's Bay company's reserve lots, and finished the subdivision of South Pine flats. I closed operations on September 26, and left for Edmonton, where I arrived on October 10.

The climate of the Peace river district is similar to that of eastern Canada and is free from extremes. The summers are moderately hot and the rainfall is adequate. Summer frosts were of somewhat frequent occurrence during our survey, but were not severe enough to do much damage. During a cold snap in the last two weeks of January, 1914, the thermometer registered -54° F., but after the Chinook winds began about the middle of February the temperature was rarely many degrees below freezing point.

The snowfall is not very heavy. Trails connect the various settlements, though the fording of rivers whose beds are composed of shifting sands, renders travel in summer dangerous. The ice on Peace river, which is safe from the middle of January to the middle of March, furnishes a good road for winter travel.

Post-offices are established at Fort St. John and Hudson Hope, mail being taken overland from Lake Saskatoon once a month. The service is rather uncertain, as it depends largely on the condition of the various rivers crossing the trail. The Edmonton, Dunvegan and British Columbia railway when built will greatly assist in the development of this district.

APPENDIX No. 19.

ABSTRACT OF THE REPORT OF M. P. BRIDGLAND, D.L.S.

TOPOGRAPHICAL AND TRIANGULATION SURVEYS IN SOUTHWESTERN ALBERTA.

My work during the season of 1914 consisted of a topographical survey of the southern part of the Crowsnest Forest reserve, and a retracement of the triangulation of the Rocky and Selkirk mountains from Calgary to within a short distance of Golden.

In order to complete these two surveys in one season it was considered advisable to start work on the latter as early as possible. Accordingly on May 12, I engaged one man and commenced this survey which was continued until May 26. During this period signals were erected at stations I to VIII inclusive, and angles read at stations I to VI inclusive. An azimuth observation was taken at station III.

As further work was then impossible, owing to the amount of snow still remaining on the higher peaks of the mountains, I returned to Calgary, engaged more men, and on May 27 proceeded to Lundbreck where the camp equipage and supplies had previously been shipped. From there we proceeded to our first camp in tp. 6-3-5 from where the survey of the Crowsnest Forest reserve was carried on until July 6.

Two extra men were then engaged, and the party was divided. My assistant with three men moved south to Beaver Mines and continued the survey of the reserve, while I with four men left for Morley on the main line of the Canadian Pacific railway, to continue the triangulation survey.

This was completed on August 31. During the intervening period thirteen stations VII to XVIII inclusive, and station "C," Beaverfoot range, were occupied, nine of which were over 9,500 feet above sea-level. Angles were read at all these stations and azimuth observations taken at Beaupre hill and Mt. King. A third azimuth observation was taken in the Bow valley near Storm mountain. All stations not previously marked were marked permanently.

On September 1, my horses and outfit were shipped by train from Field, B.C., to Hillcrest, Alberta. From there we moved south, and on September 7 joined the other party on the headwaters of Yarrow creek in tp. 3-1-5. The remainder of the season was spent by the combined parties in completing the survey of the Crowsnest Forest reserve.

The last main camp was near Waterton lakes, and supplies were brought out from Pincher Creek. At this point a very heavy snowstorm began on October 2 and lasted several days, rendering further work impossible. The party returned via Pincher Creek, reaching Calgary on October 8.

The southern part of the Crowsnest Forest reserve is about seven hundred square miles in area, and comprises the eastern slope of that part of the Rocky mountains lying between the Crowsnest branch of the Canadian Pacific railway and the international boundary. The summit of the Rocky mountains, the western boundary of the reserve, crosses the international boundary in range 1, west of the Fifth meridian, and extends in a northwesterly direction to tp. 7-6-5. The eastern boundary, which is laid out on section lines of the Dominion Lands system, and is approximately parallel to the summit, lies about fifteen miles farther east. To the north in townships 5, 6 and 7, the peaks along the summit are from 8,000 to 9,000 feet high, while east of this the hills are low and rolling, only a few of the higher points rising above timber-line. Still farther east, beyond the reserve, the hills drop off gradually toward the prairie. Farther south, in townships 1, 2, 3 and 4, the main range loses its distinctive characteristics. It

becomes much more broken and several good passes exist, of which the Akamina pass in tp. 1-1-5, is worthy of note, being crossed by a good wagon road. The country to the east becomes much more rugged and broken, peaks from 7,500 to 8,500 feet in height extending to the easterly limit of the reserve, where the change from mountains to very low foot-hills or rolling prairie is very abrupt.

As in the previous season, no organized system of triangulation was carried out, but angles were read to connect different stations as well as possible. Stations adjacent to the railway were located by the traverse made in 1913, and these in conjunction with the Dominion Lands system posts were used to locate the stations in townships 5, 6 and 7. Farther south, a closed triangulation, made in 1912 by the Geological Survey of Canada and based on the international boundary surveys, was used as a control, though several ties were made to the Dominion Lands system. Elevations were carried from stations south of the railway, altitudes of which had been determined by the traverse of the Crowsnest branch of the Canadian Pacific railway during the previous season.

The season of 1914 was not very favourable for photographic surveys. The time spent in the field from the date of commencing until the closing of actual work was one hundred and twenty-five days. During this period forty-six days were totally lost owing to bad weather, and many other days were partially lost. In September, when trying to complete the work, while only thirteen days were entirely lost, there were but nine fine days during the entire month. Much difficulty was caused throughout the whole season by high winds, which made it almost impossible to keep the camera steady or to read satisfactory angles with the transit. During the season one hundred triangulation stations, exclusive of section corners or secondary camera stations, were occupied, and sixty-three dozen plates were exposed.

Nearly all of the country is easily accessible. Wagon roads lead along the eastern escarpment, and in some places run well into the reserve. Good pack-trails with easy grades, and free from swamps or muskegs, are found in all the main valleys. Pasture for horses is very plentiful along the eastern slopes, and occasional meadows are found farther in toward the mountains. Flowers and vetches were not seen in nearly as great variety or abundance as in the previous season, while north of the railway, wild black currants were the only edible berries found in any quantity.

The western part of the reserve is heavily forested right up to the escarpment of the main range, and in the southern part where the country is more broken nearly all the main valleys are well timbered. Although the slopes adjacent to the railway have been burned, the greater part has not been touched by fire and contains much excellent spruce, with some fir. Jackpine up to one foot in diameter is found in places. In the eastern part the slopes and valleys are more open with much small poplar and willow, and scattered clumps of fir and jackpine.

Large deposits of coal occur in townships 5, 6 and 7, and mines have been started in several places, but only those near the railway are being worked at the present time. Oil wells have been drilled in three places, but no oil has been found and the wells are now abandoned. Farther south in tp. 1-30-4, there is another well which was started some years ago and abandoned. It is now being worked under new management, and at a depth of 970 feet is yielding fifteen to eighteen barrels of crude oil per day. It is intended to drill deeper as soon as the winter is over.

Fish and game are said to be very plentiful. Fish, however, did not seem nearly so numerous as in that part of the reserve north of the railway, although the Waterton lakes district is considered a good fishing place, and is a popular summer resort. There are some bears, and deer and goats were occasionally seen. On Sheep mountain, near Waterton lake, several mountain sheep were seen and the whole mountain was covered with fresh tracks. Prairie-chickens were common in the open hills near the prairie, but game birds of other varieties did not seem numerous.

APPENDIX No. 20.

ABSTRACT OF THE REPORT OF J. A. CALDER, D.L.S.

SURVEYS IN THE RAILWAY BELT OF BRITISH COLUMBIA.

My survey work of the past season was begun on April 17 in tp. 17-25-6 where we did some retracement work and traversed the left bank of Thompson river through sections 3 and 4. This traverse was necessary on account of a huge earth slide which took place on the opposite side of the river several years ago, changing its channel a quarter of a mile in one place. It is usually considered unsafe to irrigate elevated benches along Thompson river in this part of the dry belt, for should there be a substratum of clay, with a decided slope towards the middle of the valley, the seepage may give the normally rigid clay a greasy quality and thus cause the overlying mass of earth to slide.

Sections 1 and 2 of this township fall upon the side of a high rocky mountain between Thompson and Nicola rivers, near their junction, and with the exception of some fair grazing on the lower slopes these sections are of little value.

The climate and soil around Spence's Bridge are very well suited for almost all kinds of fruit and vegetables. Sheep raising has been attempted in a small way and with fair success.

On April 30, I moved by wagon to Twaal creek, about five miles north of Spence's Bridge, and began subdividing in tp. 17-25-6. These surveys were continued into tp. 18-25-6, to include all the suitable land. The boundaries of Cook's Ferry Indian reserve No. 6 were retraced, and the monuments at the corners restored. This reserve extends along Twaal creek for about seven miles, and includes practically all the best agricultural land in the bottom of the valley. The elevation increases rapidly towards the source of the creek, with a consequent increased danger from summer frosts. A good pack-trail follows along Twaal creek with branches leading into Venables and Upper Hat creek valleys. The latter trail does not appear to be very much used, for it has become obstructed by windfall in many places.

I connected my surveys in Twaal valley with the earlier surveys in Venables valley, tp. 18-25-6, and retraced a number of old provincial lots there.

The chief industry in Venables valley is stock raising, for which it is well adapted. There are good hay lands in the valley affording winter feed, while the range land towards Twaal creek is utilized during the grazing seasons.

Upon the completion of the surveys in this vicinity, I left on July 6 for Botanie lake, in tp. 16-26-6, where I was instructed to survey such grazing lands as I deemed to be of value. Lytton Indian reserves Nos. 1 and 15, include much of the best grazing and agricultural lands around the headwaters of Botanie and Skoonka creeks. These creeks are separated by a low divide about half a mile north of Botanie lake.

Subdivision was carried into tp. 17-27-6, in order to include some good range land in sections 12, 13 and 24, and connect with earlier surveys on Laluwissin creek. Some bench land at the forks of Laluwissin creek, tp. 17-27-6, was also surveyed. This is excellent agricultural land, but as is usual with small streams in the dry belt, all the available water in the creek is already recorded. This is a condition general to the dry belt and the remedy, equally general, is in this instance furnished by Pasulko lake at the head of the south branch of the creek, which forms a splendid reservoir for storing the copious freshet waters of the early spring.

Botanie lake, a little more than a quarter of a mile long, is well stocked with trout, and is a favourite camping place during the summer for people desirous of escaping the heat of Lytton. While we were there a survey was being made for the purpose of increasing the storage capacity of the lake for irrigation. A portion of Skoonka creek is now diverted by a ditch into Botanie lake.

From Lytton, a good wagon road has been graded to within four miles of Botanie lake, and is passable by wagons to the south end of Pasulko lake, but it is soft in places during spring. Good trails radiate from this road towards Fraser river, Upper Hat creek and Spence's bridge.

On August 31 I left Botanie lake to establish the boundaries of the Nicola Forest reserve from Pimainus creek northerly through townships 17 and 18, range 24. I also completed the retracement of Cook's Ferry Indian reserve No. 9. Most of the sections surveyed in these townships are hilly and only suitable for ranching. There is a strip of fair bench land, between the forest and Indian reserves, south of Inkikuh creek which, although stony in places, should prove valuable if irrigated. Pukaist creek flows through a narrow ravine in sections 9, 15 and 16 in township 18, but farther up there are good benches and meadow land, some under cultivation, the principal crop being hay. An excellent wagon road, from Ashcroft to Highland valley, passes through the northeasterly corner of tp. 18-24-6. A branch of this road leads to Spatsum, but it is ungraded and very rough and steep. A good pack-trail from Toketic follows Pukaist creek. I moved my outfit over this trail to the wagon road.

On October 1, I moved to Barnes lake where six miles of the boundary of Nicola Forest reserve were run, a portion of Oregon Jack Creek Indian reserve No. 6 retraced and some subdivision made in townships 19 and 20, range 24. Only the imperative work was done in these townships, as I was anxious to finish as many as possible of urgent surveys before closing down for the season.

On October 13 I took train at Ashcroft for Savona, where we crossed Kamloops lake, to the mouth of Copper creek, in a gasoline launch. From there we travelled by wagons to our next camp on Frog creek in tp. 22-20-6. A graded wagon road has recently been built along Copper creek from its mouth to near the south end of Red lake. A continuation of this road goes to the settlements on Criss creek, but it is very rough, being graded only where essential to make it passable for wagons.

The portions of townships 22 and 23, ranges 20 and 21, outside the Tranquille Forest reserve, along Frog creek, were subdivided for settlement. This country is elevated, rolling and well wooded with fir and jackpine. There is some good bottom land near Frog creek, and patches of hay meadow are scattered through the lands surveyed. The elevation is too high for most crops but hay. Deer, grouse and rabbits abound.

Upon the completion of these surveys I returned to Savona on October 29 and discharged the party. Taking my assistant, I then proceeded to Gladwin, in order to make a small correction survey. This was completed on November 4.

The season was quite favourable for the work. The months of July and August were very dry, and the smoke from many forest fires at times proved embarrassing.

APPENDIX No. 21.

ABSTRACT OF THE REPORT OF W. CHRISTIE, D.L.S.

SUBDIVISION SURVEYS NORTH OF ATHABASKA.

On May 21, 1914, I left Athabaska with my party and proceeded by boat up Athabaska river to Bald hill in tp. 69-23-4. From there we had to cut a trail northerly to our work around Calling lake.

Another route to reach this district from Athabaska is by the Peace River Crossing road as far as tp. 71-24-4 and thence easterly along the trail from the "Fish Camp" on Athabaska river to Calling lake. A third route follows a trail down the Athabaska to the mouth of Calling river in tp. 70-19-4, thence up the river to Calling lake. The trails on all these routes are almost impassable for wagons, but this season a settler in tp. 70-22-4 cut out the pack-trail which I had made from Bald hill into a wagon trail. The trail from the mouth of Calling river to Calling lake is passable for wagons with light roads during a dry season.

Calling lake, which is situated in townships 71 and 72, ranges 21 and 22, is about ten miles long and six miles wide. It has a stony and gravelly beach except at the southeast end where the shore is sandy. It abounds with whitefish, the catching and marketing of which forms one of the principal industries of this district. Calling river, which is the outlet of the lake, is about fifty feet wide, from three to seven feet deep and flows with a very rapid current. From tp. 71-20-4 to its mouth it is a succession of rapids. Water-power could easily be developed as the valley is narrow and from one to two hundred feet deep throughout most of its course.

South of Calling lake the country is rolling and heavily timbered with poplar, birch and spruce. The spruce is fairly large but very scattered and therefore not of commercial value.

In some areas which have been overrun by fire, and where the timber has been burned off, luxuriant grasses grow, but hay is not abundant except along the creeks flowing into the lake in tp. 72-21-4. Clay ridges with intervening muskegs are frequent, and the land when cleared would no doubt produce good crops of cereals and vegetables.

A small half-breed settlement is located on the northeast shore of the lake. These settlers have some cattle and horses and cultivate a small amount of land.

The muskegs in this district could be easily drained as they are shallow and approach very close to the valley of Calling river, and to a number of creeks.

Petroleum claims have been staked out along Calling river, but no development work has been done. The clay along the banks presents a dark oily appearance.

Game, both large and small, appears to be plentiful in the district. Moose, deer, bears, rabbits, ducks, prairie-chickens, partridges and fur-bearing animals such as foxes, coyotes, muskrats, mink and ermine were seen. Fox farms have been started along the Athabaska and the industry appears to be proving a success.

I closed operations on October 31, and returned to Edmonton.

APPENDIX No. 22.

ABSTRACT OF THE REPORT OF G. W. COLTHAM, D.L.S.

STADIA SURVEYS IN ALBERTA.

The season's work which consisted of the investigation and stadia survey of water areas was commenced on June 15, 1914, and lasted to the middle of October. During the summer, surveys were completed in twenty-seven townships, comprising generally the area from range 9 to range 14 and from township 43 to township 47, west of the Fourth meridian.

The northern part of this area is nearly all occupied by settlers, but only a small part is under cultivation, as owing to the hilly nature of the country ranching appears to be more profitable than farming. Camp lake in tp. 48-11-4 is the only fresh-water lake in the vicinity, and is partly supplied by surrounding springs. Loranger lake, only a few chains farther north, is of an entirely different character; it contains alkaline water and is of a much greater depth.

The land in the central portion, though rolling, is not unsuitable for cultivation, and produces good crops of wheat, barley and oats. However, this part is only recently homesteaded, and the area under cultivation is small.

Towards the west and south the area under cultivation is larger than to the east, and the yield of wheat in some cases was forty bushels per acre. The soil is a clay and sandy loam.

Many coulees run through the eastern part and only the land in the valleys is suitable for grain. The higher portions afford good pasture for cattle and horses.

Throughout the whole area investigated wood is scarce, and is usually only obtainable around the shores of the lakes. The largest timber seen was some poplar about twelve inches in diameter around the shores of lakes in tp. 43-11-4. Soft coal is used for fuel by the farmers. Indications of coal appear throughout the district, but no deposits of commercial value have been discovered.

Very little surface rock is to be found; some loose stone and thin deposits of shaly rock are found in the northern part.

Nearly all the lakes contain alkaline water; they are shallow and seem to maintain a fairly uniform level. A few lakes in the central part have dried up considerably during the last few years.

Small game, such as rabbits, ducks, partridges and muskrats are plentiful, and at one place a dam was built across Battle river by beavers, though none were seen.

The weather during the summer was fine, and the rainfall sufficient for the maturing of crops. No damage was done by summer frosts this season, though the district is subject to them.

Battle river, which flows through the southwest corner of this area, is approximately two chains wide with a current of about two miles per hour. No rapids or falls were seen from which power could be developed. The banks, chiefly clay with sand and gravel in places, rise abruptly to a height of ten or fifteen feet. The river valley, which is very fertile, is quite level and varies from twenty chains to nearly a mile in width. In places it is covered with a thick growth of small poplar.

APPENDIX No. 23.

ABSTRACT OF THE REPORT OF J. M. COTE, D.L.S.

RESURVEYS IN CENTRAL SASKATCHEWAN AND ALBERTA.

We began the season's surveys about May 20, by investigating some river lot monuments along South Saskatchewan river in tp. 20-1-4 and tp. 20-2-4. These townships are fairly well settled, and farmers seem to be doing rather well.

We then left for townships 22, ranges 10 and 12 and townships 21, ranges 11 and 12 which I was instructed to resurvey. For the greater part of the way I followed the trail along the Swift Current-Bassano branch of the Canadian Pacific railway, then under construction. Red Deer river cuts all four of these townships.

The north side of the river is well settled, but unfortunately crops have not been good for the last few years, due to the light precipitation. With the exception of a few springs in Berry creek valley, in tp. 22-12-4, water is very scarce, most of the settlers having to haul it from the river. The water in the Government-drilled well, at the northeast corner of tp. 21-11-4 is alkaline. The worst part of Dead Lodge canyon, in the valley of Red Deer river, lies in the latter township. In this canyon valuable fossils are found, and from a geological standpoint this region is very interesting. Indications of oil have been found.

Upon completion of the resurvey of these four townships, I proceeded on June 26 to Pakowki lake in townships 4 and 5, ranges 7 and 8. The road allowances which I followed run through a thinly-settled country, and the crop prospects in this region were poor.

Owing to continued droughts extending over the last three years, Pakowki lake was this year free from water. As the lake has a large watershed, and no outlet, it will no doubt, refill at the first wet season. The subdivision which I was instructed to do, was therefore produced as far as the well-defined shore line.

A number of settlers have taken up homesteads in the vicinity of the lake. The general lightness of the soil together with the dry climate, and the conditions above described generally prevailing in this district, would seem to indicate that in order to make a success of agriculture, dry farming operations solely should be practised. This district, however, is better adapted for ranching purposes, though the water is more or less alkaline.

After completing these surveys I proceeded to Cygnet lake, near Red Deer, which, according to reports, had been drained by the Alberta Central Railway company. Upon investigation, however, I found that the railroad grading was completed across the lake and that drainage operations had been abandoned. We, therefore, traversed the lake and produced certain subdivision lines.

Excepting those parts cleared by farmers, this well-settled, rolling country is covered with poplar, some of which measure ten inches in diameter. There is ample precipitation and crops are usually good.

On July 25, I started for tp. 54-19-4 which we resurveyed The western part of the township is rolling and covered with poplar up to fifteen inches in diameter; a few scattered spruce were also seen. The eastern part is more open and well settled. The soil generally is clay loam and crops are good. There are four lakes and many sloughs in the township, and water is fresh and plentiful.

This work was completed on September 5, when we moved to townships 51, ranges 23 and 24, west of the Third meridian, which we partly resurveyed. The only road available is the one along the main line of the Canadian Northern railway, and as the first part of the month was very wet, the roads were heavy and progress was slow.

Saskatchewan river crosses these two townships, which are covered with patches of willow scrub and poplar, some of the latter measuring twelve inches. The land is rolling, with the exception of that part of township 51, range 24, which lies south of the Saskatchewan, and those lands held by railway or land companies, these townships are well settled and generally the crops are good. Ranching has been carried on very successfully for a number of years. Good hay can be procured around the numerous lakes and sloughs, but with the exception of that in the river, all the water to be found is hard and more or less alkaline. In this region game of various kinds is quite abundant, consisting of moose, deer and a great number of wild geese, ducks, prairie-chickens, partridges, rabbits, etc.

The resurvey of tp. 51-24-3 and the south third of tp. 51-23-3 was made, but a deep fall of snow prevented the completion of the resurvey of the latter township, as the monuments which hitherto had been hard to recognize could not then be found.

I stored my outfit, discharged my men, and left for Ottawa on November 19.

APPENDIX No. 24.

ABSTRACT OF THE REPORT OF G. C. COWPER, D.L.S.

STADIA SURVEYS IN SOUTHERN SASKATCHEWAN.

The survey work on which I was engaged during the past season consisted of stadia traverses of permanent lakes over five acres in area, and of rivers over one chain in width, the investigation of sloughs and dried-up lakes and the extension of the subdivision lines over the dried-up area.

On June 4, I began the season's work on a block of thirty townships north of Maple creek.

On account of the light snowfall last winter, and the abnormal drought in the spring and early summer, I found all the lakes in this district to be dry. Some of these lakes in ordinary years are said to have from three to five feet of water, while others dry up practically every year. A number of these lake beds are now producing hay, while others are composed of soft, wet alkaline mud which does not produce vegetation and which very seldom becomes dry. The lake beds which appeared to be dry only on account of the abnormal season, and which were of no value for agricultural purposes, I traversed, while those which were producing vegetation were not traversed.

The principal lake in this block is Bitter lake in township 13, range 28, and townships 13 and 14, range 29. This lake is about twelve miles long, and varies in width from one mile to a couple of chains at the narrows in section 29, range 28. There is a bridge across the narrows, and this saves the settlers to the north a long haul around the lake to get to the railway. Bitter lake was practically dry at the time of my survey, but its bed consists of soft, wet alkaline mud which never becomes hard.

Many Island lake in townships 13 and 14, range 1, was, at the time of the original survey, a large body of water about seven miles long and six miles wide. This lake has been drying up for a number of years and all that now remains is four small sloughs, and even these sloughs were dry this year. These sloughs have a sandy bottom with the shore line poorly defined, but they will likely fill up again. The remainder of the old bed is mostly gently rolling prairie, covered with a good growth of grass.

This block of townships is mostly rolling prairie, ranging from almost hilly in some townships to gently rolling in others. The soil is mostly a sandy loam with clay subsoil, and is well suited for the growing of grain and vegetables. Good water is obtained at a depth of twenty to fifty feet.

The great drawback to this district for farming is that it is in what is known as the dry belt and one is never certain of sufficient moisture. This whole block is very well settled and practically every quarter-section of value is either filed on or leased. A large number of the settlers are Germans from North Dakota, but there are also a number of Canadians and Americans. This district has only been homesteaded for about five years; previous to this it was considered a ranching country, and there are still a number of ranchers left. The district has made rapid strides; schools and post offices are to be found in practically every township, while there are some prosperous villages on the main line of the Canadian Pacific railway which runs through townships 11 and 12 across this block. A number of the road allowances are graded and the old trails have become fenced off.

The future of this district depends almost wholly on the rainfall: with sufficient moisture the district will be prosperous. The crops this year were a total failure on account of the long drought, but, far from being discouraged, the settlers are confident of the future and were making their plans for an increased acreage next year.

There is no wood or fuel in this block, and the only wood available is in the Cypress hills to the south and in the sand hills north of Big Stick lake to the east.

The investigation of this block occupied us until July 24, when I returned to Maple creek and started to work east through townships 11, ranges 26, 25, 24, 23, 22 and 21. These townships are at the foot of the Cypress hills and, with the exception of townships 11, ranges 25 and 26, are highly rolling prairie and are more or less broken by several creeks.

The beds of the lakes in these townships were also found to be dry. A number were producing hay, while others were soft, alkaline mud.

These townships are well settled and are in close proximity to the main line of the Canadian Pacific railway. One very noticeable feature was that as soon as we started east from Maple Creek the crops appeared better, especially the wheat crop.

On reaching range 21 I turned south to township 7, range 20, and worked north through range 20 to Gull lake. The Cypress hills in township 11, range 21, take the form of an escarpment from 200 to 300 feet high. On top of the escarpment the country is gently rolling, but where creeks are encountered the valleys are wide and deep and usually have bush along their sides. On reaching the top of the bench it was at once apparent that the upper level had received more rain than the lower. Hay stacks were to be seen in all directions, while wheat and oats were much better. This part of the country is also well settled, the majority being Americans.

The Weyburn-Lethbridge branch of the Canadian Pacific railway runs through township 8 so that this part of the country is well served with railway facilities. I reached Gull Lake on August 22, having finished the investigation of townships 7, 8, 9, 10, 11 and 13, range 20, and townships 11, 12, 13 and 14, range 19. In these townships a few small lakes were encountered which carry water the year round, but the majority were found to be dry.

From Gull lake we worked east to Swift Current, and completed this block of townships as far south as township 11. We arrived at Swift Current on September 11.

In these townships several permanent lakes were traversed. The most important of these is lac Pelletier, in township 12, range 15. This lake lies in a valley about a mile wide and 150 feet deep, and the lake is about three miles long and from one-half to three-quarters of a mile wide. The water is fresh, cool, and well stocked with fish. The shore is well defined and covered with loose stones. The greatest depth found was thirty feet. A small summer resort was started last summer on the east side of the lake and as the lake is a convenient distance from Swift Current the resort should be well patronized.

Up to the time we reached Swift Current the weather had been very dry and hot, but on September 12 we had a heavy rain which turned to snow and lasted without interruption until the 14th.

The next block of townships investigated was composed of townships 11 to 14 in ranges 8 to 13 inclusive. This block is rolling prairie and is very well settled. The majority of the settlers are homesteaders, but there are still a number of ranchers left. These townships are served by the branch of the Canadian Pacific railway which runs from Swift Current southeasterly to Vanguard in township 11, range 10.

Townships 13 and 14, ranges 12 and 13, are all taken up by Mennonites of Russian nationality. These people live in villages and work their farms from the village. These villages or communities vary from three or four houses to a village with a street a mile long with houses on both sides. Each family have a large house and barn combined and a garden of about five acres. Usually there is a church, school,

and blacksmith shop. In one of these villages in which I camped they had a concrete tank and windmill supplying running water to all the buildings.

In this block of townships I found no water areas to traverse, with the exception of a small slough in township 11, range 8. The crops in this district were better than those farther west, wheat yielding from five to twenty bushels an acre, the latter on summer fallow. Oats and flax, however, were very poor and very little of it was threshed.

I completed the investigation of this block on September 30 and returned to Swift Current.

My next work was to traverse South Saskatchewan river in townships 22 and 23, range 19. On the move from Swift Current to these townships I was greatly delayed by wet weather. I reached Cabri, a town on the Swift Current-Bassano branch of the Canadian Pacific railway in township 19, range 18, on October 3 and was held up there until the 8th on account of the almost impassable condition of the roads due to the heavy rains. During this time I was able to investigate Boggy lake in this township.

I reached township 23, range 19 on October 9 and commenced the traverse of the river in this township and in township 22, range 19.

The river runs through the southerly part of township 23 and through sections 35, 36 and 25, township 22. It varies from one half to a mile in width and is full of sandbars and islands. Fifteen islands were traversed in township 23 and two in township 22. The largest of these islands is four miles long and half a mile wide while the smallest one is less than half an acre in area. They are mostly covered with a dense growth of small poplar, willow and birch and buffalo berry brushes; in places they have steep cut banks from six to twelve feet high. The valley of the river runs back for about a mile on each side but the slope is gentle and the top of the valley is not more than 200 feet above the river.

The older settlers are ranchers and the new ones homesteaders. The homesteaders however have not been settled long enough to have any crops. I completed the traverses in these townships on October 21, after which I moved to Maple Creek and disbanded my party.

During the season I completed the investigation and traverses in ninety-three townships and partially investigated a number of others. I also erected forty-four monuments which had not previously been located.

APPENDIX No. 25.

ABSTRACT OF THE REPORT OF A. L. CUMMING, D.L.S.

SUBDIVISION SURVEYS NEAR PEACE RIVER CROSSING.

Having completed the organization of my party at Edmonton, we left for Peace River Crossing, near which place my work lay, arriving there on May 11, 1914.

We began subdivision in tp. 83-21-5, as about twenty squatters were located there waiting for a surveyor to accept their statutory declarations. Most of these settlers are located in the southwest part of the township, where there is a plateau about six square miles in area. Peace River Crossing is located in the northwest corner of the township, and the growing importance of this settlement has no doubt attracted settlers to the locality. The small gardens put in by the settlers last year gave good results, and prove that the soil is fertile. Most of the land settled on is covered with light poplar and willow, but it can be easily cleared.

The western portion of the township is cut up by the valleys of Peace and Smoky rivers which are from 500 to 700 feet deep and from one to three miles wide. Peace river is about 1,800 feet wide at the Crossing, and is navigable for steamers.

I also made subdivision surveys in tp. 84-20-5, tp. 82-21-5, tps. 82 and 83-22-5 and tp. 82-23-5, all of which were completed by November 1. The land in these townships is similar to that in tp. 83-21-5, but it is not so eagerly sought after owing to its greater distance from Peace River Crossing.

I returned to Edmonton, discharged all my party except two men and left for Swan River district south of Lesser Slave lake. This is a choice farming district but the best of the land is in the Indian reserves.

After performing some miscellaneous work on Moose, Driftwood and Salteau rivers I returned to Athabaska district, where I made two small correction surveys.

We closed operations for the season on December 20.

Photo by F. V. Seibert, D.L.S.

TRACKING SCOW TO FOOT OF GRAND RAPIDS—ATHABASKA RIVER.

After running through the right channel, the scow is caught by the eddy, just below where the two channels meet. A line is attached to a float or log which is thrown into the left channel and after being carried into the eddy is picked up by the crew and fastened to the bow of the scow. The men on the island then pull the scow up to the landing where it is loaded.

Photo by F. V. Seibert, D.L.S.

SCOW GOING OVER CASCADE RAPID—ATHABASKA RIVER.

At low water the drop is about six feet and scows have to be unloaded and run over empty. At high water the drop shows only as a large wave, and scows go over the rapids fully loaded. A rope from bow to stern over some bales of hay in the centre, which act as a strut, relieves the strain on the scow, and prevents it from being broken in two.

APPENDIX No. 26.

ABSTRACT OF THE REPORT OF W. J. DEANS, D.L.S.

INSPECTION OF CONTRACT SURVEYS IN MANITOBA AND SASKATCHEWAN.

Our first work, which was begun on March 27, 1914, was the inspection of contract No. 24 of 1913 west of lake Winnipegosis.

On our route thither from Winnipegosis we passed some fine homesteads between Pine creek and Duck bay, in tps. 36 and 37-20-Pr. The surface is rolling and covered with a thick growth of poplar and willow with clear spaces throughout the district. The soil is a rich black loam and well adapted for agricultural purposes. There are many hay meadows which ensure an abundance of feed for cattle, and the water in the streams and sloughs generally is good. There is plenty of fish in the lake and game is plentiful. Employment may be obtained in the winter from the fish companies which prosecute the fish business with great energy.

The lands included in this contract, which lies immediately north of Duck bay, are generally low and flat. There are many muskegs, lakes, and tamarack swamps separated by poplar ridges of fairly good land. The timber on the ridges is only suitable for building purposes and fuel. There are many places throughout this part suitable for cattle raising, hay and water abounding

This work was completed on April 4. I then disbanded the party and returned to Brandon until after the spring break-up.

On July 11, I left Brandon with a small party for Madge lake, fifteen miles northeast of Kamsack in Duck mountains. My work here was to lay out a summer resort near the southeast corner of the lake. This lake is about three miles in length and about the same in width with numerous deep bays and small islands. In many places there are fine sandy beaches sloping back from the water for a distance of thirty feet. The higher ground is mostly covered with poplar. The crowd visiting this lake is very cosmopolitan in character; they do not all come for pleasure. Many come to fish and are well rewarded for their efforts, and some come to pick raspberries which grow in profusion on the islands. There is a good road nearly all the way from Kamsack to the resort, though the last mile or two is a little rough on account of stumps sticking up above the surface.

From there we went to St. Ambrose a settlement north of Poplar Point where a number of squatters had settled on sec. 11, tp. 15-5-Pr. This section was subdivided in such a manner that each squatter retained all his improvements. The land is very stony except the northwesterly part which is hay land. The squatters are engaged in raising a few head of cattle, and fish and hunt in the winter. I completed this work on August 28 and moved to Grand Rapids where I arrived on September 5, having travelled by steamer from Selkirk.

Our work at Grand Rapids was to survey a number of lots for settlement and to investigate the claims of squatters.

When this was completed we left by steamer for Manigotagan, intending to get off the steamer at Gull harbour or Hecla, but on account of rough weather the captain would not run into these places, so we were carried to Selkirk, where we arrived on October 3.

From there we returned by boat to Little Black river to examine contract No. 27 of 1913, which we completed on October 14, and the next day moved the party to

Manigotagan to examine contract No. 26 of 1913. We completed the examination of this contract on the 22nd. After completing the work at Manigotagan, we had great difficulty getting out, but finally took passage on a tug called the *Amisk* which landed us safely in Selkirk, having taken forty-eight hours to travel about one hundred miles.

On October 30, I went to Portage la Prairie to get my outfit which I had left near there in the spring, and on November 3, shipped it by the Canadian Northern railway to Shellbrook, Saskatchewan, at which place it arrived on November 9.

From there I left with four teams for contract No. 13 of 1911, which we reached on November 22, and completed the inspection on the 26th. We then started out to inspect contracts Nos. 13 and 21 of 1911. These contracts are situated about fifty miles north of Witchekan lake. The Green lake trail runs through one of these contracts, but we found this trail in a very bad state. In addition to carrying oats for the horses, we now had to carry sufficient hay from the Witchekan Lake settlement to do the horses while inspecting these contracts, and as the hay was loose and the trail through the bush very narrow we had considerable trouble and delay.

We completed the inspection of these two contracts on December 15; we intended to go across the country to Meadow lake in tp. 59-16-2, but could not do this on account of the streams and lakes not being frozen hard enough to carry teams. We therefore, had to take the longer trail around by Green lake. The trail on the west side of the lake is so steep that we had to let the sleighs down by means of a rope snubbed around a tree. On the east side of the lake, however, the trail is good. The country is covered with a growth of poplar, birch and willow. The surface is nearly level or gently rolling and the soil is good black loam. There are no white settlers in the district.

We arrived at the town of Green Lake on December 17 and spent one day repairing the racks of the sleighs which had got badly damaged owing to the rough road. We then proceeded to Meadow lake and thence to Beaver river in contract No. 26 of 1912 where we arrived on the 20th.

In addition to the inspection work required in this contract we had to traverse Beaver river through tp. 61-16-3, Meadow river through sections 4 and 9 in the same township, and a small lake in township 60. We completed the inspection and traverses on January 4, 1915.

The country between Green lake and Meadow lake is rolling and covered with poplar on the good land and jackpine on the sandy ridges. There is considerable land through this district suitable for farming purposes and ranching. We did not see many settlers in this part, and what few we did see are engaged in cattle raising. There is an abundance of hay all along Beaver and Meadow rivers which makes this part well adapted for that purpose. Many settlers were engaged in fishing at Waterhen lake during last winter and met with great success, a ready market being found at points along the railway.

On January 5, we started for Mervin in tp. 50-20-2, the nearest point on the railway, and arrived there on the 7th.

Between Meadow lake and Brightsand lake there is an extensive country without many settlers. The surface is gently rolling and covered with poplar, birch and willow with bluffs of spruce and tamarack. There are many open spots and numerous streams and small lakes; hay is plentiful throughout the district. The soil varies from a rich black loam to sandy loam. There is a good supply of building material and plenty of wood. The only drawback is the lack of railway facilities, and this will in all probability soon be supplied.

On January 9, we shipped the outfit to Winnipegosis, and on the 18th left there to re-inspect contract No. 13 of 1912. We completed this work on the 26th, and on the 30th arrived back in Winnipegosis. From there we travelled across lake Winni-

pegosis and lake Manitoba to tp. 32-13-Pr. We had two small corrections to make in this township, and while my assistant was making these the rest of us were engaged in making a trail to Proulx lake, in township 33, range 13, where corrections were necessary. We moved camp to this township on February 11. This lake is about five miles in length and one half mile in width; the shores are generally low with hay meadows, but in a few places poplar bluffs extend nearly to the water. There is some good land around the lake and any amount of hay. There is also sufficient timber for fuel and building purposes, for many settlers. Fur-bearing animals, such as wolves, mink and muskrats seem to be numerous. While in this camp we examined a portion of contract No. 25 of 1913, and the remainder was examined from a camp in tp. 33-12-Pr. The land throughout this contract is nearly level or slightly rolling and covered with a thick growth of poplar, willow and tamarack, with many hay sloughs and muskegs. There are, however, many sections which are well adapted for cattle raising. The soil is sandy loam on the higher levels and a deep black muck in the lower places. There are many places which could be cleared with very little labour, but there are no settlers in the district, as it is too remote from railways to attract them.

On February 19, we started for contract No. 20 of 1914 by way of Fairford and Gypsumville. This route took us considerably out of our way, but the snow was so deep that a more direct way was impracticable. We arrived at tp. 34-9-Pr. on the 23rd. Between Gypsumville and the southerly boundary of this contract there is a large area of good land. The country is gently rolling and covered with a thick growth of white poplar from six to eighteen inches in diameter, very tall and straight. The soil is a good black loam; this area of good land extends to about the middle of township 34, range 9. Most of the land in this district has quite recently been taken up, but there are still some good quarters suitable for cattle raising. The settlers have until recently found a ready market for cordwood at Gypsumville, but on account of the depression there was very little sale of wood this season: this, however, did not deter many of them from making extensive clearings which they no doubt intend to crop.

On February 28, we moved the outfit to Gypsumville, and on March 2 shipped part of it to Riverton and part to Lac du Bonnet.

At Winnipeg I divided the party, sending my assistant with some of the men to Lac du Bonnet, from which place they went to Bird river by sleigh, and examined contract No. 28 of 1913. I went with the remainder of the party to Riverton, thence by sleigh up lake Winnipeg to contract No. 21 of 1914. We inspected this contract, and on March 15 moved to Winnipeg and met the rest of the party from Bird river.

The land in contract No. 28 of 1913 is largely rock ridges, with tamarack swamps, hay meadows and small lakes, but there is some timber suitable for building purposes and cordwood.

The land in contract No. 21 of 1914 is generally level and covered with a thick growth of poplar, tamarack, birch and willow. There are many good homesteads along the shore of lake Winnipeg. In places the land is nearly clear so that little labour would be required to bring it under cultivation.

Riverton the terminus of the Winnipeg Beach branch of the Canadian Pacific railway is quite a thriving place and is the station to which many of the fishermen bring their fish for shipment to Winnipeg. About four hundred cars of fish were shipped from this station last winter.

On March 17, we started for Mafeking to inspect a contract in that vicinity. In addition to the inspection work we made a traverse of Moose creek and Steeprock river. This work was completed on March 27. I then proceeded to Dauphin where the party was discharged. Steeprock river rises in the Porcupine mountains and flows easterly through tp. 44-25-Pr. This stream spreads out and is lost in willow and

tamarack swamps; it probably finds its way into Moose creek by underground channels, and by two visible outlets from a large marsh on sec. 10, tp. 44-25-Pr.

The waters of Moose creek in many places are highly impregnated with salt, so much so that if a stick is dipped into it and withdrawn it will be found to be encrusted with fine white salt. The bushes along the stream in many places are white where they come in contact with the water. There are some good homesteads available along the line of the Canadian Northern railway near Mafeking. The land is covered more or less with bush, but it is good black soil and much of it dry, and could be cleared with little labour.

The bush lands of Manitoba around the lakes offer the settler good inducements, such as good land, any amount of fuel and building material, and abundance of hay, good water and plenty of large game. In winter time employment may be obtained from the fish companies or in logging camps.

My work took me over an extensive area of the western country, and I noticed that the settlers around the lakes were in the most prosperous condition.

The weather conditions last winter for carrying on field operations were good, not too cold and little snow except around the lakes.

APPENDIX No. 27.

ABSTRACT OF THE REPORT OF S. L. EVANS, D.L.S.,

MISCELLANEOUS SURVEYS IN SASKATCHEWAN.

The miscellaneous work on which I was engaged during the season of 1914 consisted of the laying out of roads at Madge lake, the subdivision of lots at Clear lake, the resurvey of tp. 39-13-3, tp. 16-21-3 and tp. 23-23-3, and several small surveys in the Coteau hills.

Madge Lake summer resort lies on the south shore of Madge lake, about twenty miles northeast of Kamsack, Sask., a thriving town of 1,200 inhabitants on the main line of the Canadian Northern railway. The country in the vicinity of this resort is well timbered with small spruce and poplar. A partly graded road runs from Kamsack to the lake, but the last eight or ten miles of it is a bush trail which has only recently been widened out by the forest ranger stationed at Madge lake. It is the intention in the near future to grade this latter part of the road, and when completed there will be a first-class road from Kamsack.

Clear Lake summer resort, which we next subdivided, is located in sec. 33, tp. 19-19-Pr., and lies on the west shore of Clear lake. The nearest station is Erickson, a small village on the Neepawa-Russel branch of the Canadian Northern railway. The lake is about twenty miles northwest of Erickson, and is connected with it by a fairly good summer trail. It is a beautiful clear body of fresh water five or six miles in width and abounds with whitefish and pike.

Our next work was the resurvey of tp. 39-13-3. This township lies about thirty-five miles northeast of the town of Perdue, Sask., and is in the Eagle hills. The township on the whole is very hilly and wet, having numerous small sloughs and lakes, and is for the most part covered with dense small poplar. A few of the homesteads have been taken up and where crops have been put in, wheat and vegetables have grown successfully. Most of the lands owned by railway companies are still vacant. The country to the east of this township is an excellent grain-growing district, and contained the best fields of wheat seen during the season.

On completion of the above township, we drove across country to tp. 16-21-3, a distance of over two hundred miles. On the trip we passed by way of Perdue, Harris, Rosetown, Alrose and Saskatchewan Landing.

The country as far as Rosetown is settled with a good class of settlers, and the splendid farm buildings evince prosperity. From Alrose to Saskatchewan Landing, a distance of forty-five miles, the district has been partly homesteaded in the last few years. The crop this year was almost a complete failure, having suffered from the continual drought throughout the summer.

The work in township 16, range 21, was completed August 27, and our next work was the resurvey of tp. 23-23-3. South Saskatchewan river touches the northwest corner of this township. Two-thirds of the township is hilly prairie, and most of the best homesteads have been taken up. The new Empress branch of the Canadian Pacific railway affords good shipping facilities for the settlers. This year the crops were poor on account of the drought, which was general throughout the southwestern part of the province.

This work was finished on September 21, and the dry bed of Luck lake in township 24, ranges 8 and 9, was next subdivided. This lake, which has dried up in the

last few years, is covered with a thin coating of alkali. Grass is gradually covering the lake bed, and in time these lands will make pasturage and hay lands. The surrounding district is well settled, and grain growing is successfully carried on, but only a half crop was obtained this year. A new branch of the Canadian Northern railway running south from Macrorie through the Luck lake country is being built and will give the farmers better shipping facilities.

From October 5 to the 17th, we were engaged on several small miscellaneous surveys in township 26, range 8, townships 25 and 26, range 9, and township 26, range 10. These townships are all in the Coteau hills, and for the most part are hilly prairie. Most of the best quarters have been taken up, and good crops have been grown; this year the crop was only fair. I closed operations and returned to Calgary on October 31.

APPENDIX No. 28.

ABSTRACT OF THE REPORT OF S. D. FAWCETT, D.L.S.

SETTLEMENT SURVEYS IN THE NORTHWEST TERRITORIES.

The settlement surveys on which I was engaged during the summers of 1913 and 1914, lie along Athabaska river, Great Slave lake and Mackenzie river.

Having completed our organization at Edmonton the party proceeded by rail to Athabaska and thence by a ten-ton scow down the river to McMurray, reaching the latter place on May 19.

As one travels north from McMurray the high hills gradually dwindle away and finally disappear as lake Athabaska is reached. The country south of the lake is an unbroken swampy plain as far as one can see. The north shore is rocky.

What we saw of the north shore of lake Athabaska is rock, and there is very little land close to the lake which is fit for agricultural purposes. As we entered Rocher river however the country assumed a different aspect, and some large stretches of partly open rolling land were noticed. We passed there on June 1 and the grass was even then from two to three feet in height. This land is available for ranching or farming purposes and is easy of access.

We had to row our scow forty miles down Rocher river as the water from Peace river was beginning to back up into lake Athabaska. It is not uncommon to have to track a scow down Rocher river about the first week in June. If the right bank of the river is followed at the points where rapids are shown on the maps, no danger to navigation will be encountered. In fact except for sand-bars and occasional blind channels no guide is necessary from McMurray to Smith Landing.

Slave river runs about four miles per hour and averages three-quarters of a mile in width. Its banks, excepting between Smith Landing and Fort Smith, vary in height from fifteen to thirty feet and in general are wooded with poplar and spruce. At intervals scattered clumps of spruce large enough for lumbering purposes were observed. The top soil exposures are generally a light clay loam and beneath this is a heavier clay loam subsoil. Smith Landing, where we arrived on June 4, is approached by following the left bank of the river from a point about three-quarters of a mile above it, as there is a strong rapid just at the settlement which nestles at the base of the high crescent-shaped hill.

A scow can be run down the numerous rapids on Slave river between Smith Landing and Fort Smith but we chose rather to portage everything by wagon as it eliminated the chance of losing our goods. It also saved time as several of these rapids necessitate the portaging of scow and goods, and at Mountain rapid the scow has to be hauled up a hill one hundred feet high by means of horses with block and tackle.

The road between Smith Landing and Fort Smith, about sixteen miles in length, is first class and freighters haul from twelve to twenty-five hundred pounds at the rate of three-quarters of a cent per pound.

Both Smith Landing and Fort Smith will no doubt soon be thriving towns, as all the land in the neighbourhood is very good, and it has been amply demonstrated that grain can he raised there successfully. Smith Landing will then form the landing and Fort Smith the shiping point for goods going north, while the opposite will be true for outgoing products. Power can be readily obtained from the rapids. It might also be worthy of mention that the Hudson's Bay company have a telephone system between

these two settlements. Fort Smith is the head of continuous navigation to the Arctic ocean a distance of about fifteen hundred miles. The Hudson's Bay company have a stern-wheel freight and passenger steamer called the *Mackenzie River*, which draws about four and a half feet of water when loaded. This boat navigates the river very successfully and is seldom grounded. The Northern Trading company have a one-screw steel-framed steamer called the *Northland Trader* which carries freight and a few passengers, but as she draws six feet of water when loaded considerable difficulty is experienced in low water in navigating the shallows on Mackenzie river. This latter company have also two small tug steamers which operate on the Mackenzie. The *Mackenzie River* steamboat on her first trip leaves Fort Smith about June 25 and goes to Fort Macpherson. On her second trip she leaves Fort Smith about the first week in August but goes only as far as Good Hope. The *Northland Trader* usually manages to leave a few days prior to the Hudson's Bay company's boat, but goes only to Arctic Red river. She also makes two trips during the navigation season which commences about the middle of June and ends generally in the latter part of October.

We left Fort Smith too early for either of these steamers and had drifted down Slave river about sixty miles when we were overtaken by a fishing tug travelling to Resolution. We were fortunate in getting a tow from her and reached Resolution on June 13.

Farming on a small scale is undertaken there by the members of the Roman Catholic mission and they have been able to raise wheat and oats successfully. All vegetables excepting tomatoes and melons are as easily grown as elsewhere, attain a good size and are of good quality. They have also a small herd of cattle and as considerable improvements have been made, we laid out the land for which they asked. They have also a well equipped saw-mill about four miles north of the settlement on Slave river, from which they ship shingles and lumber to their various stations on Mackenzie river. The remainder of the squatters are engaged in gardening only, so the lots were laid out of sufficient size to meet their requirements. The settlers are mostly half-breeds and Indians who gain their livelihood by net, trap and gun. There is also a detachment of the Royal Northwest Mounted Police established at this post.

We had not completed the survey of the settlement when the steamer arrived at midnight June 30, but we struck camp, rushed our things on board our scow and were soon in tow of the *Northland Trader* across the crystal waters of Great Slave lake.

This immense lake teems with the finest whitefish and lake trout that can be found anywhere. Other species such as inconnu (so-called by the discoverer of Mackenzie river, who named them "inconnu" or "unknown"), pike, pickerel, grayling and sucker are very numerous. Whitefish weigh from three to ten pounds, and trout, inconnu and pike from three to fifty pounds. On account of the water always being ice cold their flesh is very firm and is excellent food. No doubt some day as transportation becomes easier the fishing industry will be developed.

A sandy beach forms the south shore of Great Slave lake and there is a little fringe of land close to the lake front which is fit for agriculture, but this rapidly merges into muskeg which will be of no commercial value till drained. The north shore is said to be rocky, gardens being made by the arduous labour of wheeling earth from wherever it may be found and spreading it out over the rocky surface.

There are deposits of galena located about thirty-five miles southwest of Resolution and about eight miles inland. They are reached by a very marshy trail in which one sinks knee-deep at every step. These deposits occur in limestone formation and will yield from five to ten per cent. Copper has been found on Big Island about halfway between Resolution and the eastern end of the lake. Perforated limestone containing pockets filled with a yellowish oil which burns freely, is often picked up on the shores of the lake and of Mackenzie river. Between the headwaters of Mackenzie river and the north arm of the lake there are considerable deposits of tar asphalt.

On July 1 we arrived at Hay river where the steamer stopped a few hours to unload merchandise and then departed for the north. Wrigley harbour at the west end of Great Slave lake was reached at midnight of the same day and the steamer anchored till daybreak, as great care was necessary there in following the tortuous shallow channel. As it was, the boat ran aground soon after starting and remained aground most of the summer, so we continued our journey alone.

The Mackenzie is noted as one of the largest and grandest rivers in the world. Its waters are clear till they mingle with the muddy waters of Liard river at Simpson where they become a dirty greyish colour and remain so to Good Hope, our journey's end. Whitefish, pike, inconnu, pickerel, grayling and sucker are plentiful, while trout are numerous at Wrigley harbour. From that point the fresh-water herring run in shoals during the months of July and August and these are excellent food. The width of the river varies from one-half to two miles, but some of the lake expansions are much wider. The current seldom falls below four miles per hour and frequently attains a rate of eight miles in what might be considered rapids.

We passed Providence at midnight on July 2 and drifting on down the river arrived at Simpson on the afternoon of the 5th. We remained there till July 28 making a survey of the settlement. Simpson, in north latitude 61° 52′ (approximately), is situated on an island at the mouth of Liard river. There is a surface soil of rich sandy loam generally eighteen inches in depth with a sandy clay subsoil. A large area of land, which will no doubt be of commercial value before many years, extends up Liard river into British Columbia. After many trials it has been amply demonstrated that oats can always be grown and that wheat is sure three times out of five, although it is liable to be slightly frosted. Vegetables do exceedingly well. Mr. Harris, the Indian agent there, informed me that in the fall of 1913 he took one hundred and twenty bushels of fine large potatoes from one-third of an acre of land. Tomatoes and melons can be raised, but it is necessary to start them under glass. Small fruits such as raspberries, blueberries and cranberries can be had in abundance throughout the Mackenzie district. The winters are long and severe, but on account of the length of the summer days plant growth is very rapid and, as no frosts occur till well on in August, plants are almost certain to attain full growth. There is always sufficient rainfall to maintain the crop. The Department of Indian Affairs have a saw-mill established there, which is proving a great benefit to the settlers as it supplies them with shingles and lumber at a small cost.

We laid out thirty-eight lots of various sizes according to the needs of the settlers, and I do not think there will be any further surveys required for some time unless a gold rush occurs.

In the spring of 1914 a French prospector took a scow load of miners' utensils and supplies up Liard river from Simpson to commence operations on a gold claim he had discovered during his explorations there in the summers of 1911 and 1912. He was accompanied by four helpers but we could not find out where the deposit was located or of what extent it was.

About eighty miles below Simpson the general westerly direction of the river turns abruptly to the north where the Nahanni mountains, a spur of the Rockies, bars its westward progress. There the river seems to have cut its way clean through the mountains and two gigantic rocky cliffs resembling Gibraltar stand guard over the unexplored treasures of North Nahanni river. From that point northward the scenery along the Mackenzie becomes much more beautiful.

We arrived at Wrigley on July 30, having spent thirty-six hours on the trip from Simpson, a distance of one hundred and sixty miles. This settlement is merely a trading post and no attempt whatever has been made at farming, the squatters contenting themselves with the garden produce they raise. We therefore laid out only small lots to cover the claims of the traders and half-breeds and a few additional lots to cover any future claims. The people there are all half-breeds and Indians.

We left Wrigley on August 12 for Good Hope, as we had decided to survey that place next and track back up the river to Norman, thereby saving the expense of dog trains from Good Hope to Norman. The evening of August 12 we experienced a sharp frost.

On August 15 we passed Norman, where we cached supplies for our return. Good Hope, the most northerly point of our trip, was reached on August 18 after a week's travelling, the distance from Wrigley being close to three hundred and forty miles. During our whole trip down the Mackenzie, we encountered no obstacle to navigation. There are two rapids between Norman and Good Hope: the first one is the Sans Sault, which is run by following the current of Carcajou river that comes in from the west just at the head of the rapid. The other is Rampart rapid, which is easily run by keeping close to the right bank of the river, so close in fact that one could almost jump from the scow to the mainland. As this latter rapid is approached, high perpendicular sandstone cliffs apparently hem the river in on all sides. However, upon rounding a bend or two, walled with these towering cliffs, Good Hope appears high up on the hillside, its whitewashed buildings gleaming brighly in the sunlight.

Even at this settlement, on the verge of the Arctic circle, we found thriving gardens in which potatoes, onions, lettuce, rhubarb, turnips and carrots were growing. No farming has ever been attempted so we laid out lots of sufficient size to meet the requirements of the settlers. We also surveyed a lot containing one hundred and twenty-one acres to meet the demands of the Indians, of whom there are about six hundred trading at this post. The work we have done there will be sufficient for many years.

While we were there an Indian brought in a piece of native copper that he picked up on Loon river which flows into the Mackenzie twenty-five miles north of Good Hope.

We had a snow-storm on August 31 and also experienced considerable wet weather in the first two weeks of September.

Throughout the north moose, caribou, and bear are plentiful but it is necessary to go back some distance from the river to hunt. Mountain sheep and goats roam the mountain slopes, while ducks, geese, ptarmigan and partridges can be obtained with but little effort during the summer season. Fish of course are to be had in abundance if one carries a net of three and a half inches mesh.

We left Good Hope on September 18 and tracked our two canoes up the river to Norman where we arrived on September 30. This settlement is situated at the mouth of Great Bear river. There, as at all the settlements we visited, the only white people we found were the representatives of the two missions and the clerks of the Hudson's Bay and Northern Trading companies. These usually comprise about five per cent of the squatted population.

The only grain grown there to my knowledge is barley, the summer season being too short for wheat and oats to mature. The white people have small gardens, and the Indians depend for their livelihood on trapping, hunting and fishing. We laid out twenty-six small lots and a larger one to serve as a reserve for the Indians.

The country between Norman and Great Bear lake is largely muskeg which extends close to the settlement, Norman itself being located on a fringe of dry land between the edges of this muskeg and the banks of Great Bear and Mackenzie rivers.

Great Bear lake is open during the latter part of July, August, September and October of each year. Its waters are alive with magnificent lake-trout, whitefish and herring, besides other less valuable species. Countless number of caribou roam the "barren lands" which surround the lake, and the Indians still hunt them down with bow and arrow.

There are deposits of native copper in the vicinity of this lake, at Dismal lakes and on Coppermine river. Mr. John Hornby, an English explorer, who has spent the past seven years on the barren lands, gave me a sample of this copper which he picked up on Coppermine river.

Great Bear river can be ascended in July and freezes over about November 10, but on account of drift ice canoes are useless after the third week in October.

About twenty-five miles up-stream from Norman on the left bank of the river, there are deposits of lignite of good quality. There is also another seam a short distance above this post which is on fire and has been smouldering away for many years. We also heard that a short distance down-stream from Norman crude oil could be seen oozing out of the ground at low water but as we did not pass it at the right time of the year, we were not able to observe this ourselves.

Mackenzie river was frozen over completely by November 18 and on November 25 we left Norman with three dog trains for Wrigley. On account of the strong current between Norman and Wrigley it is the last portion of the river to freeze over and the drift ice from above comes down and piles up, forming a terribly rough and jagged surface for dog teams to travel upon. In fact we had to cut many miles of trail for the sleds through this rough ice, and upon several occasions we ran into ice walls four feet thick and fully eight feet in height. Our progress was necessarily slow, but we at last reached Wrigley on December 4. By the latter part of December the snow covers up most of these rough parts and the journey can be made in six days, which is the usual time taken by dog trains between posts.

We waited at Wrigley till December 9, when the dog trains arrived from Simpson as had been previously arranged. After one day's rest, these trains carried us to Simpson, where we arrived December 16, in time to catch the outgoing mail to Athabaska, which left December 17.

In this north country the winters are long and during January and February the cold is intense. On one occasion the thermometer registered 58 degrees below zero, Fahrenheit, and frequently during the day it was 40 degrees below. The Indian agent utilizes the winter months for logging purposes and he is provided with two teams of work oxen. Hay for their use is obtained up Liard river a short distance from the post. I understand it is not so long since the Hudson's Bay company had a fairly large herd of cattle at this post which was at that time the headquarters of the company for the Mackenzie River district. North of Simpson there is a very small quantity of timber fit for lumbering purposes but to the south and up Liard river there are large areas covered with timber of commercial value. The Royal Northwest Mounted Police, who now have a detachment established there, are aiding the fire patrols and, comparing the summer of 1914 with that of 1913, we noticed a very large decrease in forest fires.

During the latter part of February and beginning of March we traversed a portion of Liard river and laid out a reserve for the Indians about Simpson. This was done at the request of Mr. Harris, the Indian agent.

It is difficult to obtain dog trains during the months of January and February, as the Hudson's Bay company have their trains carrying mail and making inspection trips between posts while the Indians are away on their hunting expeditions.

Early in March I sent my assistant and three men ahead to Hay river, and after the March mail came into Simpson, followed them as far as Providence. By dividing the party we were able to utilize the time from May till the third week in June, when, on account of the spring break-up, it is impossible to travel on the Mackenzie. We occupied this time in surveying and mounding the two settlements.

The land at Providence is fairly good and we accordingly laid out a few large lots in case any person should care to farm the land. Oats and barley are grown successfully here, but Father Giroux, in charge of the Roman Catholic mission, says that wheat seldom gets beyond the milk stage. We also laid out a large lot which will serve as a reserve for the Indians who visit the post. The Roman Catholic mission has a convent there and are educating the Indian boys and girls from all parts of the country to the north. They have also a small herd of cattle. Hay is found in abundance in the vicinity of the fort, and is of good quality as was testified to by the

excellent condition in which we found the cattle after the long tedious winter. The remainder of the lots were laid out as garden plots and sufficient were surveyed to last for some years.

At Hay river two large lots were laid out, one for the Anglican mission and the other for the Indians. The other lots were laid out to take in the claims of the various settlers and each settler was given land according to his requirements. We laid out thirty-two lots in all which I think will be sufficient for at least ten years.

The land bordering on Hay river and on Great Slave lake consists of a fertile sandy loam and the gardens produce splendid vegetables. Wheat and oats have been successfully grown. Settlers have been able to seed the land as early as the first week in May, and on account of the long summer days plant growth is very rapid.

The climate throughout the north during the summer is ideal and not liable to sudden change. It becomes very warm during July and August. There is just enough rainfall to keep the ground in excellent condition for grain or vegetable growing. The wet season seems to extend from the latter part of August to the middle of September and frosts are then of frequent occurrence.

Fifty miles up Hay river from the settlement the Alexandra falls are to be found. The main fall is one hundred and six feet in height, and the lower fall forty-six feet. At the main fall the river runs between limestone cliffs, and power can be easily developed when necessary. There is a lot of good land bordering on Hay river, and it becomes better as one journeys up the river. Just above the main fall there is a fine park-like country to be seen.

We left Hay river June 30, 1914, and crossed Great Slave lake by canoe to Resolution, arriving there at midnight on July 2. We completed the survey of this settlement on July 28, and next day caught the steamer *Mackenzie River* for Fort Smith where we arrived on the 31st.

At Fort Smith we learned that engineers had been busy running location lines for a tramway between Fort Smith and Smith Landing so that in the near future there will evidently be a quicker and cheaper method of transportation than there is at present. I understand that most of the surveyed portion of Smith Landing and Fort Smith has been taken up so that there will be additional survey work required around these places in a short time.

We left Smith Landing on August 4, on board the steamer *Grahame* and arrived at McMurray on the 9th. We then hired two pack-horses and took the overland trail to House river arriving there August 14. We passed through some fine ranching country portions of which were suitable for farming, especially as we approached House river where we found subdividers at work.

We then loaded our outfit on board the gasoline launch which plies twice a week between Athabaska and House river and reached Pelican settlement at dark on August 15. We there subdivided the front portions of lots 8 and 9 into village lots, which work completed our operations.

APPENDIX No. 29.

ABSTRACT OF THE REPORT OF J. A. FLETCHER, D.L.S.

BASE LINE SURVEYS IN NORTHERN ALBERTA.

On April 8 I left Edmonton and travelled by rail to Sawridge, and thence by winter trail to Peace River Crossing where I arrived on April 20, 1914.

The outfit and supplies were loaded on scows which had been constructed for us, and the trip down Peace river was begun on April 26. At Carcajou point, which we reached on the 28th, enough supplies to last the party about two months were cached. The remainder was sent down to Fort Vermilion. The pack train which had been wintered west of Fort Vermilion met us at Carcajou point and we immediately moved to the starting point of our work in range 17.

The survey of the 26th base was commenced on May 1 and continued easterly without interruption till we reached range 9 on June 22. As the supplies were by this time running short this part of the work was discontinued for the time being, and the party and outfit moved north to the 27th base.

Arrangements had been previously made to have the supplies which had been sent to Fort Vermilion taken up Wabiskaw river as far as possible. Owing to the low water the highest point reached was about six miles north of the 27th base line. A cache was built at this point.

The survey of the 27th base was commenced in range 9 on June 25. Immediately after leaving the Wabiskaw very swampy country was encountered over which it was impossible to use pack-horses. Consequently the pack-trail was run east from the cache which had been built on the Wabiskaw as far as Mikkwa river, where access to the line was again possible by pack-train. At this time twenty-one pack outfits were burned, and until they had been replaced from Fort Vermilion, the survey proceeded somewhat slowly. The line was completed to the Fifth meridian on August 24, and on the 25th the return trip to the 26th base was commenced.

Work was resumed on this base on September 3 and continued without interruption till the meridian was reached on November 2. The north boundary of fractional range 25, west of the Fourth meridian was then surveyed, and the mounding entirely completed on November 4.

Our trail out, was by way of the Burnt lakes, Chipewyan lake and Wabiskaw to Sawridge, where we arrived on November 30. From there we took the train to Edmonton where the party was paid off.

The weather during the season was delightful, the warm period experienced at the commencement of the survey continuing without interruption till its completion. Considerable rain fell during the year, and on account of the moisture combined with the warmth, the spring growth was early and rapid. The daily growth of grass on the western slope of Buffalo Head hills was quite marked during the second week in May, and by the middle of May the grass in range 15 was a foot high. The horses were fed in this range till the camp was moved out of reach, and no more grass even of average quality or quantity was found till the survey reached Wadlin lake. Some good grass was found on the east end of this lake in range 10. However, the good feeding of range 15 and the absence of flies in quantity at that time, put the horses in good enough condition to carry them across the succeeding interval of coarse and scanty feed. There are some excellent meadows along Wabiskaw river especially from township 102 north. Horse feed along the 27th base line was excellent. Numerous creeks along which were old beaver workings provided rich bottoms for luxuriant grass and peavine. In spite of the fact that the flies were exceptionally bad during the months of July

and August, the horses gained sufficiently, so that the majority came through the succeeding months of poor feed and heavy work successfully.

On the return of the party to the 26th base in September, the frosts soon reduced the quality of the grass, which was not in quantity to render foraging easy. In October it was all frozen and dry, and an interval was crossed in ranges 4 and 3 where there was no feed. The trail at this time was difficult, and the older horses fell off badly. Three of these died on the trip out, but as there was good feed along the trail all the way to Sawridge, and as oats and hay were available in places, twenty horses survived.

During the season, three canoe trips were made down the Wabiskaw to Fort Vermilion for oats, extra supplies and mail. This work relieved the strain on the pack-train, rendering the completion of the survey possible before the beginning of winter. Two men were required to manage the canoe.

In high water canoes could be successfully used on Mikkwa river, but in low water the numerous rapids make travel very difficult.

The country on the 27th base is quite level, the interval between Wabiskaw and Mikkwa rivers, and also the territory for about ten miles east of the Mikkwa being subject to very little drainage. The ridges are merely slight elevations on which the growth of poplar and spruce is possible on account of the ground being heated, in the absence of standing water. They are therefore ridges of timber rather than rises in the ground. With the exception of some large scattered spruce growing along Mikkwa river, very little timber of milling size was seen on this line. The district I believe would be suitable for agriculture, but on account of the swampy nature of the ground and the difficulties of transportation, there is at present very little inducement for settlement. Ranges 1 to 5 are not so swampy as ranges 6 to 9, but are more difficult of access.

On the 26th base line, ranges 16 and 17 lie at the base of the western slope of the Buffalo Head hills. There is sufficient slope for the country to be well drained by numerous creeks. These ranges would make good agricultural land as would also parts of range 15, where the country is more rolling. Windfall and brulé at present cover most of this country. From range 14 to Wabiskaw river, the country is more or less rolling with intervals of muskeg. The soil of the rolling country is mostly light as is indicated by the extensive growth of scrubby jackpine. Wadlin lake is crossed in ranges 11 and 10.

Range 9 is quite broken by Wabiskaw river, which curves around the eastern limit of the Buffalo Head hills. A small creek which drains Wadlin lake crosses the 26th base in a deep rock-bottom ravine and flows into the Wabiskaw just south of the base line. On account of having a fall of approximately 1,300 feet in a distance of about six miles this stream resembles a mountain torrent in places and considerable water-power could be developed, due more to the head of the water, however, than to the volume of discharge. In the neighbourhood of the Wabiskaw there is considerable timber of milling size both east and west of the river. Farther east along Mikkwa river and again on Burnt river some large spruce is to be found. This could be easily carried to Peace river during high water.

From the Wabiskaw eastward to the Fifth meridian the country is quite flat or gently undulating. Mikkwa river flows in a valley from a quarter to half a mile wide and from fifty to eighty feet lower than the surrounding country. The country back from the valley appears capable of being drained and afterwards would make good agricultural land. However the drainage problem is a large one and for this reason settlement will likely be slow.

Moose seem plentiful in this district especially over the Buffalo Head hills. Bears are numerous along Wabiskaw and Mikkwa rivers. Fur-bearing animals are numerous, consisting of beaver, foxes, martin, wolves, lynx, rats, etc.

APPENDIX No. 30.

ABSTRACT OF THE REPORT OF W. A. FLETCHER, D.L.S.

STADIA SURVEYS IN CENTRAL SASKATCHEWAN.

The district from Swan River to Yorkton, through which we travelled to reach our work, for the most part is settled by Dukhobors and Galicians, with some Russians and Austrians. The majority of the Dukhobors live under the community system, where all profits and products are turned into one general coffer, whence each in turn receives his allotted supply. Quite a large percentage, however, live independent of the communities on their own homesteads.

This section is largely covered with a thick growth of poplar from four to six inches in diameter, and has innumerable sloughs and ponds of all sizes. As the settlement is recent most of the road allowances are impassable, and good or even passable trails continuing more than five miles in any direction are hard to find.

Our work consisted in the investigation of water areas in the vicinity of townships 25 to 27, ranges 11 to 14, west of the Second meridian. Most of the townships in this district are well settled, and a fair percentage of the land is under cultivation. Most of the land is rolling with scattered bluffs of poplar. Small lakes are quite numerous.

Speaking generally of the whole district, the settlers are rapidly turning towards mixed farming. More hay, oats and barley are being grown each year instead of wheat. Dairying is also becoming an important industry, many large herds of milking cattle being observed.

Owing to an unusually dry summer the grain crop was only about forty per cent of the average of more favourable years. The potato crop, owing to drought and a heavy frost early in August, was almost a complete failure.

I closed operations and disbanded the party on October 17.

APPENDIX No. 31.

ABSTRACT OF THE REPORT OF L. E. FONTAINE, D.L.S.

INSPECTION OF CONTRACTS IN NORTHERN ALBERTA.

I organized my party at Edmonton and from there proceeded to Whitecourt, in tp. 59-12-5, where I arrived on September 27, 1914. Contract No. 18 of 1913, which I completed inspecting, lies in the immediate vicinity.

We then returned to Edmonton, and on October 7 left for Spirit River. There I mapped out the work for the first part of the season consisting of the inspection of four survey contracts, one in Grande Prairie district and three near Peace River Crossing. This kept the party busy until February 16, 1915.

The weather during the survey was fine. The fall was dry and the winter mild with a very light snowfall.

The routes followed were the main ones of the respective districts. The Edmonton, Dunvegan and British Columbia railway runs mixed trains to McLennan on Round lake, and steel is laid to within twenty miles of Peace River crossing. When this road is completed a twenty-four hours' journey will take one from Edmonton to the Crossing, whereas in the past it has taken about twenty days.

We returned to Edmonton on February 25, and on March 1, I left for McMurray to inspect four contracts in that vicinity. At this place the work was carried on with sleighs till the spring break-up and then by pack-trains and canoes.

The McMurray district has not shown as much development as the Peace River, although it has natural gas, tar sands and water-powers. Telegraphic communication has been established between Edmonton and McMurray and the contractors of the Alberta and Great Waterways railway expect to have the two places connected by rail in February, 1916. This will prove a great impetus to the development of the district. About one hundred tons of asphalt from deposits near McMurray have been shipped to Edmonton, where it is being given a trial on road making.

I closed operations for the season on June 4, 1915.

Photo by F. V. Seibert, D.L.S.

RE-LOADING AT FOOT OF CASCADE RAPID—ATHABASKA RIVER.

This shows the method of handling supplies where the distance is not great. Each article is passed along a chain of men from one to the other until it reaches the scow where it is stored away by three or four extra men. In this way six ton of supplies were unloaded, the scow run over the cascade, and re-loaded in forty-five minutes.

Photo by F. V. Seibert, D.L.S.

LOADING HORSES ON SCOWS AT McMURRAY—ATHABASKA RIVER.

The horses are taken overland from Athabaska to this place, as the rapids on the river between these two points make transport of horses by scows risky. Below McMurray there are no rapids and no trails, which render transport of horses by scow both possible and necessary. From eight to twelve horses and three to four ton of supplies are placed on each scow. The horses are unloaded every night and re-loaded in the morning owing to the cold nights. These horses travelled 110 miles in this way without accident.

APPENDIX No. 32.

ABSTRACT OF THE REPORT OF J. S. GALLETLY, D.L.S.

SUBDIVISION IN NORTHERN MANITOBA.

My work consisted of subdivision surveys along the Hudson Bay railway from the vicinity of Pas, north to tp. 64-14-Pr.

We left Pas on July 9, 1914, and travelled by construction train to mile 93, which was in the vicinity of the most northerly part of our work.

For transport outfit we used a small velocipede and a standard push car, and to this I later added a hand car, as I found we could save considerable time going to and from work by its use.

We continued surveying in ranges 14, 15 and 16 until September. We then returned to Pas to make some surveys in townships 56, ranges 26 and 27, west of the Principal meridian. This kept us busy till November 6, when we began working north again along the railway. We brought our work to a close in the vicinity of tp. 62-18-Pr. in the early part of March and returned to Pas, where the party was disbanded.

The country surveyed along the Hudson Bay railway between ranges 14 and 19 is mostly level, or very gently rolling. It is generally of a swampy nature, and one might well describe it as a succession of spruce and tamarack swamps, alternating with ridges of limestone on which there is always a growth of jackpine with some poplar.

In several places we dug to a depth of about six feet to get drinking water, and it was usually found that at a depth of about two feet there was a very good clay soil. On top of this clay there is a thick growth of moss which holds the water like a sponge, and which would have to be removed before anything could be done in the way of farming operations. It could be cut, dried and stacked and would make peat of good quality, and if this were done the clay loam left would, if properly drained, form a first-class soil suitable for mixed farming and grain growing. In range 14, I noticed one or two ditches put in by the railway constructors from the track to Mitishto river, and the effect was very noticeable, this being one of the driest parts of the district surveyed, yet I was told that this had been one of the worst swamps that the railway had to cross.

There are a few spots where the clay comes close to the surface, and on one of these I found a trapper with a small garden in which he was successfully raising potatoes, carrots, turnips, cabbage, lettuce and radishes, and there appears to be no reason why the same could not be done elsewhere, if proper drainage were provided.

I also saw oats and barley growing along the track, the seed evidently having been dropped from cars in transit.

Though swampy, none of the land is liable to flood through the overflowing of rivers. There is no hay in this part of the district.

The timber consists of spruce, tamarack, jackpine and poplar, and seldom exceeds a foot in diameter. The reason of this is that the moss in the swamps is not strong enough to hold large trees in a high wind, and on the limestone there is not usually sufficient soil to give large roots a firm hold. There is plenty of small timber in the country; in fact there is no open country in the usual sense of the term.

Mitishto river is the only stream of any size in this district; it is a little over a chain wide and about three feet deep, but the current is very slow, seldom exceeding a mile an hour. It lies in a slight depression which can hardly be called a valley, and in only one place, on the east boundary of tp. 64-14-Pr., were the banks steep. Elsewhere the slope is so gradual as to be unnoticeable. It flows from the east end of Limestone lake, crosses the track close to the lake and is never far from the railway as far as our survey went. Many of the swamps along the railway could be drained into it. No water-power could be developed.

No coal or lignite was found, nor was there any mineral of economic value seen within the limits of the survey. The new gold field, at Herb lake, is not very far away, however, and is reached by a sleigh trail, cut after the survey was made, which leaves from the siding at Woody lake in tp. 64-15-Pr. about eighty miles from Pas. Prospectors state that the claims are very good, and that the district will develop into a good mining camp.

There is no stone suitable for building, but limestone is everywhere plentiful. It is probable that a considerable part of this could be used in the manufacture of lime.

Summer frosts occur, but these would not be sufficient to hinder any farming operations which might take place.

Two large lakes were seen in this part of our work, Woody lake in tp. 64-15- Pr., and Limestone lake in tp. 62-18-Pr. The former is from twelve to fifteen miles long and six miles wide; it lies in a southwesterly direction, the northeasterly extremity being in tp. 64-15-Pr. Its shores, as far as we saw them, are sandy or rocky. It empties into Woody river, which is twenty feet wide and six feet deep, and has a current of about six miles per hour. I was informed that it runs in an easterly direction and then southerly flowing into Pine river. Limestone lake lies wholly in tp. 62-18-Pr.; it is five and a half miles long and half a mile wide. A trail runs from the southwest corner of this lake to Moose lake, about eight miles distant in a southerly direction, but as fires have caused a large part of it to be filled with deadfall, it is not at present suitable for use. Both Limestone and Woody lakes are deep and the water in them is good and clear.

There is a spring of excellent water at mile 78 on the Hudson Bay railway in tp. 63-16-Pr., close to the track. We found it running in March, and it is apparently open all winter. It is by far the best water we obtained in this district.

Game is scarce, and with the exception of a moose, some caribou, and a few partridges, we saw nothing. Fish can be obtained in Woody and Limestone lakes, but both have been pretty well fished out, and it will take some time for a fresh supply to accumulate. Jackfish, whitefish, lake trout and sucker are the chief varieties obtainable. Several men were at work fishing in Moose lake last winter, and they stated that the supply was good. When a lake shows signs of depletion the fisheries inspector either refuses to permit fishing in that lake or limits the catch to a certain amount. This method should preserve the supply indefinitely.

In township 56, range 27 lie parts of Saskeram and Reader lakes. Both of these lakes are very shallow and have muddy bottoms. Three rivers, Saskatchewan, Carrot and Birch, run through the township, all three being navigable rivers while the last mentioned drains Saskeram lake. The east boundary of the township is only three miles from Pas.

Between the Saskatchewan and the Carrot there are numerous hay meadows and some swamps. The hay, a blue-joint of fine quality, is growing on a deposit of clay brought down by the rivers and left during the periods of flood. A conservative estimate of the amount of hay which can be cut in this township alone would be in the neighbourhood of four thousand tons, and this could be increased by draining some of the swamps.

The meadow extends beyond this township into the adjacent ones, between Saskeram lake and Saskatchewan and Carrot rivers, and it would provide an immense amount of hay and make a good place for ranching. The only objection to putting it to such a purpose is the liability of the whole of it to flood. As I understand it, this is not likely to occur at high water in July, but just after the break up in the Spring, and it is caused by the ice jamming in the Saskatchewan at Grand Rapids some distance below Pas.

As the soil is first class, it makes it a very desirable locality for mixed farming and grain growing. The former is badly needed in this vicinity, as Pas with a population of fifteen hundred is using condensed milk almost entirely and vegetables are at excessive prices.

I found seven settlers who had gone in along the banks of Carrot river to homestead, and four of them told me they had cut six hundred tons of hay from their four fractional quarter sections, and they had not by any means stripped the quarters of what hay was on them. These men know of the liability to flood, but they believe that it will not happen again, as the volume of water in the river seems to be lessening each year. In the fall ducks are very plentiful in Saskeram lake and the neighbouring marshes, and there are some geese to be had also.

APPENDIX No. 33.

ABSTRACT OF THE REPORT OF JAMES GIBBON, D.L.S.

SURVEYS IN THE YALE DISTRICT OF THE RAILWAY BELT, BRITISH COLUMBIA.

Survey operations of the past season were commenced on May 6, 1914, in tp. 5-26-6, in the valley of Coquihalla river. I followed this river as far as the northern part of township 23 in range 7, subdividing all suitable lands. An independent and continuous traverse was also run along both banks of the river from its intersection with the east boundary of sec. 7, tp. 5-25-6, to its intersection with the outline between ranges 24 and 25 in township 6. From this latter point a single traverse line was run for both banks, to the intersection of the east boundary of sec. 33, tp. 7-23-6. These traverses made an independent check on all section corners and lines established.

My surveys in the Coquihalla valley had reached within a couple of miles of the steel on the new Kettle Valley railway, and as the back trail was both dangerous and difficult on account of canyons and heavy blasting on railway construction, I got transportation over this railway to Merritt, and thence to Hope by Canadian Pacific railway. I commenced the surveys required in township 5, range 26, on October 21.

On completing this survey, I closed field operations for the season, and on October 31 paid off my party. The lower parts of Coquihalla valley can be conveniently reached from Hope by wagon and pack-trail. The upper reaches can be more easily reached by the Kettle Valley railway construction train from Merritt.

The greater part of Coquihalla valley is heavily timbered with large fir, cedar and hemlock, reaching well up on the mountain slopes, with dense undergrowth in the lower elevations. This meant heavy continuous axe-work all season in the projection of our lines. The valley is comparatively narrow with precipitous mountain sides of about 4,000 feet elevation.

Anderson, Pierre and Dewdney creeks are tributaries from the east. Their valleys are narrow and confined with steep slopes starting from the water's edge and leaving no bottom or agricultural lands. There is considerable fir and cedar in these valleys, but it will be difficult to get out, owing to the rough nature of the creeks and the confined valleys. Timber berth location No. 458 is on Dewdney creek two or three miles from its mouth.

Ladner creek comes in from the west, joining Coquihalla river in sec. 24, tp. 6-25-6. There is considerable fir and cedar timber throughout its valley and on the adjacent mountain slopes, and also on the south side of the creek, extending back from Coquihalla river some two or three miles. This is a more promising section for timber than the other tributaries, but part of timber berth No. 177 extends into this region of timber and of course occupies the most accessible portions. This valley presents no agricultural possibilities.

These creeks are from seventy-five to one hundred links wide and from two to three feet deep under ordinary conditions, and have a current of six to eight miles per hour.

From Ladner creek up through ranges 24 and 23, the river narrows to about one chain in width, and decreases correspondingly in volume. On reaching township 7, range 23, there is a sudden rise of some fifty feet, and the river bottom widens out into a natural dam location. Some water-power could be developed at this point, but the supply of water would be rather uncertain, owing to the elevation and the nearness

to summit, causing the supply to come nearly all from flood conditions. It might, however, be practicable to use it as a means of converting the timber above it into lumber.

There are some indications of minerals in the lower stretches of the valley. Several miners were operating in a small way all summer, prospecting and washing out placer gold from the gravel bars of the river. They reported better than wages as the result. Some rich prospects in gold-bearing quartz are reported as being found and opened up on the western slope in township 6, range 25; as high as nine hundred dollars to the ton is reported. Staking of claims has been active all along the hillsides.

Very little game was seen other than a few mountain goat and indications of black bears and deer. The river contains numerous small trout, but is kept pretty well fished out by the large number of men working on railroad construction.

No doubt in the near future when the new railway is in operation throughout the valley, the natural resources in timber and minerals will be developed, and the favourable spots for cultivation will be taken up. There is a splendid opportunity for the erection of a portable mill or mills at favourable points for manufacturing and shipping lumber, ties and wood, and thus utilizing and conserving much valuable timber that usually goes to waste in general lumber operations.

The season was very favourable for field operations, with very little rain, no excessive heat and few flies.

APPENDIX No. 34.

ABSTRACT OF THE REPORT OF T. D. GREEN, D.L.S.

SUBDIVISION IN SOUTHWESTERN ALBERTA.

My work during the past season consisted of subdivision surveys west of Red Deer in tps. 35 and 36-8-5 and tp. 40-10-5.

We outfitted at Rocky Mountain House and left for tp. 35-8-5, reaching there on June 12, 1915.

Two routes lead from Rocky Mountain House, the nearest railway station to our work. The first and old route crosses the upper bridge over Clearwater river, passing Dovercourt post-office and thence to Ricinus in tp. 36-7-5. Up to this latter point the country is well settled and the roads are generally in fair condition, but beyond that the wagon roads are newly cut out by survey parties, and after reaching range 8, practically make a circuit around the central portions of townships 35 and 36. An old pack-trail follows the northwesterly or left bank of the Clearwater through these townships, and continues up stream probably to the source and beyond, to join the pack-trail from Laggan to the Kootenay plains. There are several different branches running north towards the Saskatchewan. One of these, which forms the second route to the district, leaves the pack-trail in range 9, and goes northerly to Swan lake, thence northeasterly along Swan creek, passing through the northwesterly portion of tp. 36-8-5. The Forestry Branch has recently improved this trail to such an extent that wagons can now travel thereon from Prairie creek to the Clearwater. It joins the Prairie creek-Rocky Mountain House trail near the mouth of Swan creek. The latter is a wagon trail leading to Rocky Mountain House by either the upper or lower bridges over the Clearwater. The route by the upper bridge is much better though longer.

Township 40, range 10, can now be reached by railway, as Horburg a station on the Brazeau branch of the Canadian Northern railway is situated in section 6, tp. 40-9-5. In addition to this the Northern Construction company's "tote" road from Rocky Mountain House leads to the southern part of the township and a branch therefrom leads through the northeastern part along the south branch of Baptiste river.

In these upper reaches of Clearwater, Saskatchewan and Baptiste rivers moose and deer are quite plentiful, and rabbits are so numerous as to be a nuisance. Fish also are very plentiful. Ordinarily there is not enough snow for sleighing before the latter part of December, but last fall there was sufficient snowfall early in November for permanent sleighing. The ordinary depth of snow in the winter is about fifteen inches.

Owing to the high altitude and the existence of large muskegs and marshes summer frosts are prevalent in the district.

The river valleys are excellent for cattle ranching.

SESSIONAL PAPER No. 25b

APPENDIX No. 35.

ABSTRACT OF THE REPORT OF A. H. HAWKINS, D.L.S.

MERIDIAN AND BASE LINE SURVEY IN NORTHERN MANITOBA.

On March 5, 1914, I left Pas, the place of organization and proceeded to Thicket portage, travelling ninety miles by Hudson Bay railway and thence by freight teams for one hundred miles along the right of way.

Our first work of the season was the survey of the Principal meridian through townships 81 to 88. Owing to the late spring it was possible to place a considerable amount of supplies on the north boundary of township 82, about twelve miles beyond the starting point of our survey. From Thicket portage the outfit was moved by dogs teams along a fairly good sleigh road, to Partridge Crop lake, but from there north to Odei river in township 82 progress was slow, on account of soft weather, deep snow and lack of trails. From Odei river man-packing was resorted to for a distance of about twelve miles, to the northeast corner of township 83.

The rivers broke up about May 10 and as all our canoes were at Thicket portage in township 73, we had to construct rafts to cross Odei and Meridian rivers. The men with the canoes arrived on June 10, having travelled via Wintering and Partridge Crop lakes, Grass river, Split lake and Burntwood, Odei and Meridian rivers. Later we found a much shorter route on the west side of the meridian from Thicket portage to Burntwood river, and thence down that river. Meridian river which had apparently never been used as a canoe route was full of log jams. We cleared these out, and now a waterway extends from Thicket portage to township 86. No farther waterway exists, as this appears to be the divide between the Churchill and the Nelson.

Odei river which is about two chains wide and from six to sixteen feet deep, with a current of two to three miles per hour, crosses the Principal meridian in township 82. A half mile farther east it is joined by Meridian river which crosses the meridian once in township 85, once in township 84 and three times in township 83. The source of Meridian river is Big Fish lake in township 86. From this lake short portages can be made to navigable waters flowing north into Churchill river.

The country crossed by the line is all clay formation, and judging from the banks of the streams the clay is of considerable depth. A granite ledge on the summit of a ridge in township 84 was the only rock seen south of Big Fish lake. The clay belt apparently extends from Burntwood river to township 89. The surface in the southern part of this belt is gently rolling, and muskegs, sloughs and floating bogs are numerous. The surface soil in the depressions is peat with clay subsoil, while on the higher lands the clay appears on the surface. Forest fires are prevalent, as during the summer the dry moss burns like tinder.

The northern part of the clay belt is gently rolling and covered with spruce and tamarack up to ten inches, with some poplar and birch up to six inches. A few large spruce grow alongside the rivers, but the timber generally is suitable only for pulp.

Swamps, marshes and muskegs abound throughout the whole region, and thorough drainage is necessary before settlement could be attempted. The many streams would render drainage comparatively easy, and danger from early and late frosts would no doubt be greatly lessened.

No grass grows in the district, but gardening at Norway House and Split lake has been carried on with considerable success.

The district is easily reached by water from many points on the Hudson Bay railway, but the waterways are difficult to follow.

Water-power could be developed on Grass, Nelson and Burntwood rivers. A fall of about twenty feet was also seen on Meridian river in township 82, the portage around it being about five chains.

No coal, lignite nor minerals were noticed in this district.

A few foxes, wolves, bears, mink, otter and martin were seen, and moose appeared to be plentiful. Beaten paths indicated that the barren lands caribou had wintered there, but they had gone north before our arrival.

Frost occurs every month of the year except perhaps July. At the beginning of May, 1914, there was two feet of snow which did not entirely disappear before the middle of June, and frosty nights began on August 20.

Levels were taken on the line to township 88, and magnetic observations were made at frequent intervals. Some azimuth observations and one observation for latitude, consisting of seventy pairs of stars, were destroyed by a camp fire on July 1. This fire also destroyed some of our supplies, so that after surveying the 22nd base line one range east and west of the meridian, we returned to Pas reaching there on September 19.

I then organized a party for the retracement of the Second meridian from the 15th base as far north as township 85, and of the 15th base westerly from the meridian to range 22.

We left Pas on October 10 and on the 26th began work on the meridian at Namew lake. This place was selected as a starting point, as the line farther south was reported to be very wet.

Moving camp had to be done by canoes and man-packing, the dog trains being left at Namew lake till cold weather would set in. Comparatively mild weather prevailed until the middle of November so that the dog trains did not arrive until the 20th.

Directly north from Namew lake dry, rocky country, well timbered with black spruce, tamarack and jackpine, extends about six miles north and three miles on each side of the meridian, but farther north the country is mostly muskeg.

The wagon road follows the east side of the meridian to within a half mile of Sturgeon-weir river where it crosses the meridian and leads to a place called Beaver City, on the south shore of Amisk lake. If the mining locations around this district prove valuable this centre will be of some importance, as great opportunities exist for the development of water-power, and fish and game can be had in abundance.

In the north part of township 62 there is an extensive spruce muskeg with a hard bottom about fourteen inches below the surface. Timber, which grows larger toward the north, is found on small ridges throughout the muskeg.

The limestone formation which was in evidence all along the line from Namew lake disappears in township 64 and a granite formation begins. Mineral indications are found along this line of contact.

On November 20 the dog trains reached camp and the lakes being frozen sufficiently for travel they were used for moving camp and taking in supplies. The seven trains proved inadequate as we had to move camp every second day.

In township 68 the line crosses the first of the chain of large lakes which form an almost continuous waterway to township 85. Whitefish, jackfish, pickerel and sucker appeared to be plentiful in these waters and form the chief diet of the Indians living there. Feed for the dogs consisted of fish caught in these lakes, and it was necessary to keep one man fishing and looking after the nets while we were in this locality.

The southern fringe of the herds of barren land caribou were seen in township 84, but the main herds were farther north as the winter was mild.

The Second meridian was finished to township 85 on January 10, 1915, and the portion of the line south of Namew lake, which was too wet to retrace in October, was finished by the end of January. In this portion only township 58 is wholly on land. The main trail from Pas to Cumberland House passes the north end of Belanger lake in township 57. Much traffic passes over this trail in winter as all supplies from Pas for settlements west and north pass over it. Large quantities of fish shipped to Pas also go over this trail.

Steamers on Saskatchewan river can pass into Cumberland lake during high water, and from there through Whitey and English Narrows into Namew lake. Amisk lake is then reached by a short portage from Namew lake. Amisk lake is about thirty miles long and sixteen to twenty miles wide. Its shores are well wooded, and much work has been done developing mining claims along the west side. The fishing industry is also important, as during last winter considerably over one hundred tons of trout and whitefish were shipped from this lake. Churchill river, which crosses the line in township 79, appears to consist of a series of lakes stretching across the country. The shores are rocky and frequent rocky rapids render navigation dangerous.

Several lakes lie along the meridian north of township 85, the largest being Kamuchawi lake in township 83. This lake is about twelve miles wide and fifteen miles long.

Only a small amount of tillable land is found in this district, and it is all covered by forests. Garden vegetables grow at Cumberland House and I am told also at Amisk lake. Fishing and mining are likely to prove the most important industries.

The retracement of the 15th base west of the Second meridian was begun on February 1, 1915. This line follows along Saskatchewan river, crossing it three times in the first eight ranges. If the spring freshets on the Saskatchewan could be controlled and this land reclaimed from flooding, hay for many thousands of cattle and horses could be secured.

The valley of Torch river, which is first crossed in range 8, is well wooded with spruce, tamarack, poplar and cottonwood up to twenty inches. Some good farms are found in the valley, but the remainder of the country is one vast muskeg, with a few sandy jackpine ridges.

In range 17 the line crosses sand hills, some of which are bare on the tops, while the slopes are covered with spruce, tamarack, poplar and white birch. An old surveyed line of the Hudson Bay Pacific railway was crossed in range 18.

The line was completed across range 21 on March 10 and Cumberland House was reached on the 17th.

The mild winter and light snowfall made the trails bare very early in spring and travelling with sleds was difficult.

Very little merchantable timber was seen except along Torch and Saskatchewan rivers. No hay meadows or marshes were noticed farther north than Saskatchewan river, muskeg and sand ridges being the predominating features of that district.

APPENDIX No. 36.

ABSTRACT OF THE REPORT OF G. H. HERRIOT, D.L.S.

BASE LINE SURVEYS IN NORTHERN MANITOBA.

The survey of portions of the 19th, 21st and 22nd base lines east of the Principal meridian, portions of the 23rd and 24th base lines east of the Second meridian east and the Second meridian east through townships 85 to 88 inclusive, together with certain township outlines, comprised my work of the past season.

From Selkirk we went north by boat to Norway House, thence by barge to Whisky Jack portage, across this portage and down Cross lake and Nelson river to Shoal falls. We portaged the outfit on the tramway to Sipiwesk lake and then went by canoe to Cross portage. After crossing this portage we followed Landing lake to where our season's work commenced on the 19th base at the Principal meridian.

On June 24, after retracing a couple of miles of the Principal meridian, we turned off an offset line to the east, at three chains south of and parallel to the 19th base line. This offset line was necessary because the intersection of the 19th base and the Principal meridian falls in Landing lake, and is witnessed by an iron bar and mound on the south shore four chains distant from the true corner.

The offset line was extended eastward across Landing lake a distance of a little more than eight and one-half miles, when the east mainland was reached. The azimuth of the offset line was carefully determined, and its length ascertained by laying off two base lines on the south shore of the lake, and from these base lines a double system of triangulation was extended down the lake to the point where the offset line struck the east shore. There a third base was opened and chained, to which the two systems of triangles were tied, in order to test the accuracy with which our triangulation had carried forward our standard of measurement. The test was very satisfactory. On reaching the first summit we opened a line north on which we established the position of the 19th base line, and after opening the line westward to the lake shore, we commenced its production eastward. It was continued without interruption until the NE. cor. tp. 72-5-E. was reached on July 29.

During the greater part of the work on this base line canoes were used for shifting camp, although three moves occurred involving back-packing, but even where the canoes were used quite a number of portages were necessary.

On July 29, the party returned to Nelson river, and the following day proceeded down the river and reached Split lake on August 1. On the 4th, we left Split lake with five Indians, bound for Landing river, and proceeded up Landing river to the fourth rapid, from where I sent three canoes with three Indians and three of my regular men back to Shell rapids to commence freighting down the Nelson. The remainder of the party pushed on to Surprise lake where we pitched camp about two miles east of the NE. cor. tp. 80-11-E. The following day, August 7, we began the production of the 21st base line, and it was continued eastward with all possible speed, until on October 13 the NE. cor. tp. 80-20-E. was reached. The country traversed is broken by innumerable lakes entailing many triangulations. Cyril lake and Fox lake owing to their size required very large triangles and much careful work. The transport over the first twelve miles of this base line was handled by canoes and only the portages necessitated back-packing. Then for a stretch back-packing was resorted to, until Cyril lake was reached, when canoes were again used

until Fox lake was crossed. From the east shores of Fox lake back-packing was again necessary, the canoes being used only to take supplies down Fox river. Over this latter stretch of country a canoe had to be carried along the line, as many lakes were encountered during its production.

During this period of the survey the party was greatly handicapped for lack of regular packers. It had been necessary to leave one of my most reliable packers in charge of the Indians freighting from Shell rapids down the river to a cache they were placing just above Kettle rapids, and two others were busily engaged freighting from Shell rapids direct to camp. Moreover, as the waterways along Fox river route entail many long portages, these latter freighters and my camp transport were greatly delayed. The axemen and others of the party were therefore frequently required to assist the regular packers.

On August 21, I left camp to return to Winnipeg for my winter transport, and after a few days spent in hiring five more men to assist in taking the dogs down the river, I started north again. At Little Bull Head we picked up thirty-six dogs that had been purchased for me. Five more dogs were purchased below the lake and taken with the others down the river as far as Shell rapids. From this point the dogs were led along the right of way of the Hudson Bay railway to Landing river, where they were met by three canoes that had gone around by Nelson river, Split lake and Landing river. On October 8 we started up Landing river, and on the 17th reached Fox lake, where I left two men to fish for dog feed. On the 19th I proceeded down Fox river to try to reach camp with the winter outfit before freeze-up. After a trying journey we came up with the camp on the east outline of tp. 82-20-E.

On October 26, I sent a number of men back to Fox lake to bring in the dogs as soon as sufficient snow had fallen and the lake should be passable, for on the nights of October 24 and 25 some of the smaller lakes had frozen over. Two of the trains were to go to my cache near Kettle rapids after supplies, as we were running very low, and to rejoin the party after it would be moved up to the 22nd base line.

In the meantime we continued the east outline of range 20 north, and opened the theoretical jog to the east by November 2. Four dog teams had arrived the evening before, although the scanty amount of snow limited their loads very materially. The next day we commenced to move north to the 22nd base line, but owing to the soft snow that had fallen during the night, the dog trains could haul but very light loads. We were therefore compelled to back-pack the greater part of the outfit. Progress was very slow as it was necessary to double trip over the whole journey, for our outfit had been greatly increased by the addition of camp stoves and winter tents and clothing. It was not until November 6 that we at last pitched camp within two and one-half miles of the NE. cor. tp. 84-20-E.

The following day most of the party commenced work on the east outline of this township, while with three men and a dog train I started to open a trail west, to make a juncture with the trains bringing supplies from Kettle river cache. We made connections with these trains the next day, and returned to camp only just in time as the last of the flour was in the bake-pan, and we had been out of bacon and some other supplies for several days.

We completed the east outline as far as the 21st correction line on November 18, and then moved back to the 22nd base line, which we extended eastward to the Second meridian east, and by December 22 the meridian was surveyed north as far as the monument established by Mr. B. W. Waugh, D.L.S., to mark the intersection of the 23rd base line with the meridian.

Throughout this period the snowfall was comparatively light, and this, combined with the rough hummocky nature of the surface of the country, made the transport very hard on the dogs. Many of the dogs played out and not a few died on the long trips. As previously pointed out the summer freighting had been carried on under great difficulties, with the result that only actual camp necessities were brought down

to the Kettle river cache. No cornmeal nor tallow were carried, as I felt that fish could be caught for part of the season at least. Three men were left at Fox lake to fish. All the dog feed had therefore to be hauled over these rough trails, and as the distance from Fox lake was rapidly increased the work of transporting feed and supplies became more and more difficult.

On November 27, I left camp to return to Shell rapids, to make arrangements for winter freighting, and did not again reach camp until December 13. On the journey, I met the engineer in charge at Port Nelson, and from him received an order for cornmeal and tallow at the Government cache at Limestone rapids, which is located about sixty miles up the Nelson from Port Nelson. He also furnished me with a description of the location of the Government cache at this point, and one near Angling river, but even with this information at hand, it took me four days to locate and open a trail to Limestone cache from my camp.

Between December 22 and February 18, the 23rd base line was extended across the first eleven ranges east of the Second meridian east, without any delays, although on occasions the progress was generally retarded, owing to the inadequate transportation facilities. On February 19, the east outline of range 11 was turned off to the north, and produced across townships 89 and 90. The theoretical jog was completed to the east on February 25 and on the following day we moved north to the 24th base line, commencing its production eastward. This line was continued as far as Hayes river, where we endeavoured to extend it across the river, but owing to the overflow caused by the tides we were compelled to abandon this part of the work. We accordingly returned to the north shore of the river, where we turned off a line parallel to the east outline of range 11, and produced this line south across the river, computing the distance across by means of a double triangulation. From here we opened a line east to its intersection with the theoretical position of the east outline of township 92, range 11. Here the east outline was turned off and first opened north to Hayes river, and then run south to the jog at the correction line. Work was completed on March 11; and the following day we moved back to York Factory.

During the interval between Christmas and the conclusion of the survey, we fed the dogs on cornmeal and tallow, part of which was hauled from Limestone cache and part from Port Nelson. Although this feed was closer than the fish, it was far from satisfactory, as both the meal and tallow were of an inferior grade. I therefore endeavoured to use a few fish along with the meal, but very few fish could be taken in Fox lake and our attempt to fish in Angling lake proved a failure.

My transport, from Christmas until February 19, when my men reached camp with dogs secured from Mr. B. W. Waugh, D.L.S., consisted of seven trains. And it was only the fact that I had received permission to draw one month's supplies for twenty men from Limestone and Angling river caches that made it possible for this small transport to handle the work. Moreover, the line was advanced rapidly eastward, necessitating frequent moves, and the scarcity of firewood made it necessary to haul wood, thus augmenting the already heavy work for the dogs. Throughout January what trains I could spare from time to time made trips to Port Nelson after supplies, so as to be able to keep ahead of the actual needs of the camp.

The advance on the 23rd base line eastward steadily increased the distance from the tote road north of the river, so that each trip to Port Nelson necessitated the breaking of new and longer trails from camp. However, with the arrival of Mr. Waugh's dogs, my transport was easily able to handle the work, and it was possible to send two hired dog teams back to Split lake.

On March 13, we left York Factory on our return, arriving at the end of steel on the 24th, and at Pas the following night. The next day I paid the party off.

About 240 miles of base line and meridian outlines, and about one and one-half miles of jog on the correction lines, were opened during a period from June 24, 1914, to March 11, 1915.

The country traversed by the survey may be described according to the different base lines. The 19th base line passes through the best country met with during the survey. The country west of Nelson river is much broken by Landing and Sabomin lakes, and numerous smaller lakes. In the immediate vicinity of the lakes the land is low and tends toward muskeg, but back from the water areas the surface rises gradually, forming land much more suitable for farming. The soil is usually a deep clay overlaid by a few inches of moss. Landing lake is a beautiful rock-bordered body of water probably thirty miles long and from one to one and one-half miles wide. The water is exceedingly clear and abounds with whitefish. Sabomin lake is only four or five miles long. The timber throughout this area is stunted, although fairly thick, and consists largely of spruce from three to six inches in diameter. A few larger spruce are to be found in a fringe about the lakes and on the islands. Nelson river is crossed by the 19th base line in sections 33 and 34 of range 4 east. It is here thirty-eight chains wide, with a very swift current. The western bank is quite precipitous and very rocky, while the eastern slope is very gradual. East of the river fewer lakes are met, and the surface, although almost level, is covered with very hummocky moss and is very much wetter in places. A large portion of this section is covered with small fire-killed spruce, and the surface soil has been seriously damaged by repeated fires.

The 21st base line passes through nearly level country in range 12 east, with the result that it is mostly one continuous muskeg, covered with small stunted spruce and tamarack. It is broken by Surprise and War lakes, the latter of which abounds with whitefish. In the eastern part of the range, burnt country is met and much standing, fire-killed spruce appears. The luxuriant growth of wild berries testifies that the surface soil has not been injured by the recent fires. This portion of the country is very suitable for agriculture, with a deep clay soil covered by a very shallow layer of moss. Farther to the east many small lakes are met but only those connected with Fox river have any whitefish. Cyril river traverses ranges 13, 14 and 15 just a short way south of the base line. This river is only about fifty or sixty links wide, and at low water is not very suitable for large canoes. In low water the river above Cyril lake has many rapids necessitating frequent portages some of which are almost one-half mile long.

Cyril lake is crossed by the line in range 15. It is about four to five miles long and one and one-half miles wide. Just to the north of it, a high jackpine ridge occurs to break the otherwise regular surface, while still farther to the north extensive swamps appear. The country between Cyril and Fox lakes is nearly level, broken here and there by small lakes. The surface is low and swampy, and although drainage is possible, and clay is to be found below the muck, the land will be of little value for many years. Small spruce and tamarack give place occasionally to fire-killed timber.

Fox lake is crossed in ranges 17 and 18 east. This is a fine body of water with an irregular shore line, It is seven or eight miles long and from two to three miles wide. Whitefish, jackfish, pickerel and sucker abound in its waters, but owing to the many shallow bays it is difficult to locate them in mid-winter. Fox lake discharges its surplus waters through Fox river, which is several chains wide near the lake, but after following a sluggish meandering course for two or three miles it narrows down to a stream about two chains wide, with exceedingly swift water. During the fall of the year when the water is low, it is a very bad river for canoe work, as its bed is full of boulders, and the current is so swift that one is either stranded upon a boulder, or else by it before it can be seen. The whitefish are easily taken about the end of September by damming this stream at a rapid, and catching the fish in a willow basket.

The country lying east of Fox lake is broken by many small lakes. The surface is somewhat irregular, owing to the occurrence of low ridges, which are generally covered with small jackpine. Elsewhere small spruce and tamarack appear. The soil is

a clay overlaid with varying depths of moss and black muck. Small areas are very suitable for farming, but the largest part of the country requires draining.

Range 20 is traversed by Thick Bush creek as it flows south into Fox river. Along its banks is to be found a fringe of good spruce, some trees reaching a diameter of twenty-eight inches.

The country traversed by the east outline of range 20, through townships 81 and 84 inclusive, is generally very wet and swampy. A jackpine ridge breaks the swamp in township 82, while township 81 is broken by three marsh-bordered lakes. This section is very undesirable, while townships 83 and 84 are in parts so wet as to be almost impassable in summer.

The 22nd base line across ranges 21 and 22 east runs through better country. It is broken by tributaries of Angling river, which probably accounts for the drier surface.

The Second meridian east across townships 85, 86, 87 and 88 traverses considerable swampy country. To the east of the meridian Angling lake breaks the otherwise regular surface. This lake lies in a northeasterly and southwesterly direction, and is about eight miles long by one-half mile wide. Whitefish, jackfish, trout and sturgeon are to be found in its waters, although efforts to catch them in midwinter were unavailing. Considerable burnt country adjoins this line; and the frequent fires have materially impaired the soil. Clay underlies the moss and black muck in all sections. In section 14, township 87, Nelson river is crossed. It is here fifty-one chains wide with a very swift current, as testified by the manner in which the ice was piled up five to eight feet at this crossing. It required the work of three men nearly a whole day to cut a dog trail across the river on account of the rough ice. The clay banks are between eighty and one hundred feet high.

The location line of the Hudson's Bay railway is crossed in section 2, township 88. The country north of the Nelson adjoining the railway is nearly level. Frequent beaver dams occur, thus creating flooded areas. The timber is fire-killed in places, with the remaining areas covered with stunted spruce and tamarack. The otherwise regular surface is broken by slight rises, forming islands of drier land covered with a denser growth of spruce.

The 23rd base line east of the Second meridian east, traverses country very similar to the above. In section 32, township 88, range 2, Nelson river is again crossed. The approach from the west parallels a small creek and is therefore gradual, while on the east side the line leaves the river by ascending a very steep bank. The banks along here are from eighty to one hundred and twenty feet high with frequent steep clay cut banks. A narrow fringe of fair timber is found at intervals in the valley, with some rather good pulp timber in other places.

The country east of the Nelson, is comparatively dry until after Angling river is crossed in section 32, range 3, but small spruce and tamarack is still the prevalent growth. A great many small lakes break the regularity of the surface. These lakes are generally connected by small creeks so narrow as to be useless for canoe transport. The soil is clay overlaid with several inches of moss. Occasional open swamps adjoin the lakes. Angling river is a winding stream two chains wide, flowing in a valley about fifty feet deep. The fall over a length of about thirty miles between Angling lake and Nelson river, is approximately 200 feet, with the result that the current is very swift, necessitating almost continuous tracking when going up-stream. East of Angling river the country is nearly level, and large swamps are more frequent, many of which are connected by small creeks. The soil is largely a moss-covered black muck, eighteen to twenty inches deep, overlying a yellow clay. In many of the pits, water appeared before the depth of eighteen inches was reached. Stunted spruce and tamarack appear everywhere except on the open swamps. Occasional belts of brule were crossed where the surface has been dry enough to allow the fires to run. Owing to the depth of snow

over these areas it was difficult to ascertain how badly the surface soil has been damaged by the frequent fires.

In section 36, range 8, the line crosses Penny-Cuttaway river. This stream which is six chains wide, follows a very winding course in the bottom of a narrow valley about seventy-five feet deep. A fringe of fair timber, mostly spruce, is found in the valley. This river rises near where Fox river empties into the Hayes, and after a most meandering course, roughly parallel to the Hayes, it discharges its waters into this river about three miles north of the base line. It is very difficult to determine just where the height of land between Nelson and Hayes river watersheds crosses the line.

Hayes river is crossed in section 32, range 9. Occasionally the steep banks recede in gradual slopes from the bed of the river, but elsewhere a forty-foot bank rises on either side. Clay cut banks occur at intervals, and innumerable springs break through the foot of the slopes, making the edge of the river bed almost a continuous sloping ice sheet in winter. Some fair spruce suitable for building purposes grows in the valley. The Indians from York Factory have for many years cut their timber up this river and its tributaries, and after rafting it down to York, have whip-sawed it for building purposes. The current of the Hayes is very swift as testified by the rough ice. In fact a great deal of tracking is necessary when going up-stream. A few small rapids occur between York Factory and the mouth of Shamattawa river, but none that would prevent the rafting or driving of sawlogs.

The country east of Hayes river adjoining the 23rd base line is very undesirable, consisting chiefly of extensive swamps, broken by small islands of higher ground. These swamps extend eastward beyond range 11 east, and south probably ten miles, and to the north almost to Hayes river. It was plainly evident that this district would be practically impassable in summer. Stunted spruce and tamarack grow where the open swamps give place to bush land.

The country traversed by the east outline of range 11 is very similar to that traversed by the last two or there ranges of the base line. Hayes river is crossed in section 25, township 92, and being within about three miles of its outlet it is about two miles wide at this point. The tide waters from Hudson Bay affect the water level of the river for a distance of about twelve miles up the river. In usual tides the change in level is about eight feet, while in spring tides the water rises fifteen feet above ordinary level.

The 24th base line across range 11 east runs along the long point between Nelson and Hayes rivers. The land is very level and is largely one extensive tamarack and willow swamp. Hayes river is reached in section 35 of this range. York Factory lies partly in sections 21, 22, 27 and 28 of township 92, range 11. It is quite a large Hudson's Bay post, comprising in the reserve about 177 acres. It was surveyed in 1901. Several very large buildings give the post quite an imposing bearing. These extensive structures speak in no uncertain manner of the amount of supplies that once entered the interior of western Canada by way of this natural gateway. For years before the railway reached Winnipeg, supplies were brought across from England in the Hudson's Bay company's boats and landed in York Factory. These supplies were handled in York boats by way of Hayes and Nelson rivers. Many tons of supplies were taken up Hayes river to the Nelson and thence up the Nelson to Warren's landing. From this point many tons were taken across lake Winnipeg to old Fort Garry, while other supplies were taken across to Grand Rapids and hauled across the long portage and started on the journey up the Saskatchewan, to such posts as Pas, Prince Albert, Fort Saskatchewan, etc. York Factory was thus a flourishing post before Winnipeg was even dreamed of. However, with the advent of the railway through the west, York Factory lost its prominence and many of the Indian families whose men depended on the summer transportion for employment, moved farther inland to the interior posts at Split lake, Cross lake, Nelson House, Oxford House and Norway House, where hunting and trapping were more plentiful..

Port Nelson is situated about one mile north of the 24th base line in range 9 east of the Second meridian east, on the north bank of the Nelson within only a few miles of the mouth of the river. Port Nelson is to be the terminal of the Hudson Bay railway. Work was in progress on the construction of harbour facilities, about 500 men being employed.

The only residents of this country are at present located at the several Hudson's Bay company's posts and at Port Nelson. The Hudson's Bay company's posts at Norway House, Cross Lake, Split Lake and York Factory are comprised mostly of the Indians gathered about the posts. Split Lake post is situated on the north shore of Split lake, and about twenty-five miles north of the 21st base line, roughly in range 9 east of the Principal meridian. The Indian population probably numbers about 300. At Port Nelson there is a large transient population, but only a few permanent residents.

The climate throughout the district is sufficiently uniform to consider it as a whole. Throughout the summer the days are very warm, and the nights are quite cool. The daylight, however, is exceedingly long with the nights correspondingly short. Summer frosts occurred in May and June and again in August and September.

The winter, extending as it does from the latter part of October until well on into April, is rather severe. Last year was regarded as the most unusual year, the amount of both the rainfall and snowfall was below the average, while the temperature throughout the winter was much higher than the general average. In the winter of 1913 and 1914 the meteorological reports at Port Nelson give an average of possibly 30 degrees below zero for the months of January, February and March, while during last winter the average for the same period would be less than 20 below, the severest record at camp was 54 degrees below zero. Port Nelson recorded 59 degrees below zero that same night.

The summer weather indicates that the climate is not very suitable except for the most hardy growth, although lettuce, radishes, potatoes, onions, turnips and cabbage have been grown at Split Lake post. Potatoes of small size, and a few other hardy vegetables have been grown at York Factory on a clay soil that has been hauled from the river banks to replace the moss and black muck on the surface.

The resources of the country, covered by the season's survey consist largely in water-powers and fur-bearing animals. Almost all kinds of fur-bearing animals found in Northern Canada are to be found here. Beaver, mink, marten, muskrat, otter, weasel, wolves, and foxes, including red, cross, silver, and white, are to be found in the district. The white foxes, however, are found largely along the coast, while the others keep more to the interior. The Indians generally make a rich fur catch each winter.

A few moose and caribou are to be found in the district. The barren land caribou or husky deer usually migrate south early in the winter, crossing the Nelson at Split lake and Gull Lake. Few ducks and geese frequent these lakes in summer and even the partridges and the ptarmigan are not plentiful.

As already stated, numerous rapids are met on all the rivers and streams. During the summer of 1914 and the winter of 1914 and 1915 the Manitoba Hydrographic Survey had a party metering and cross-sectioning Nelson river about four miles above Shell rapids, but their figures will omit the additional discharge from such rivers as the Armstrong, Landing, Grass, Burntwood, Ripple, Butnau, Kettle, Limestone, Angling and Kisemaguskun. Again, each one of these tributaries of the Nelson has numerous falls, which, if dammed, would produce considerable horse-power. No estimate has been made of the discharge of these rivers so that it is impossible to give even a rough approximation of the possible power development.

Fox river, as previously stated, has many rapids, and although the discharge is small, the fall over these is very considerable and much power might be developed.

Photo by J. R. Akins D.L.S.

LAUNCHING SCOW AT PEACE RIVER CROSSING.

For transportation on Peace river, scows are built, during the winter, on the shore just beyond high-water mark, and they are hauled down to the river when the ice moves out in the spring. They have a carrying capacity of twelve ton, and require the united efforts of fifty men to drag them along the skids to the water.

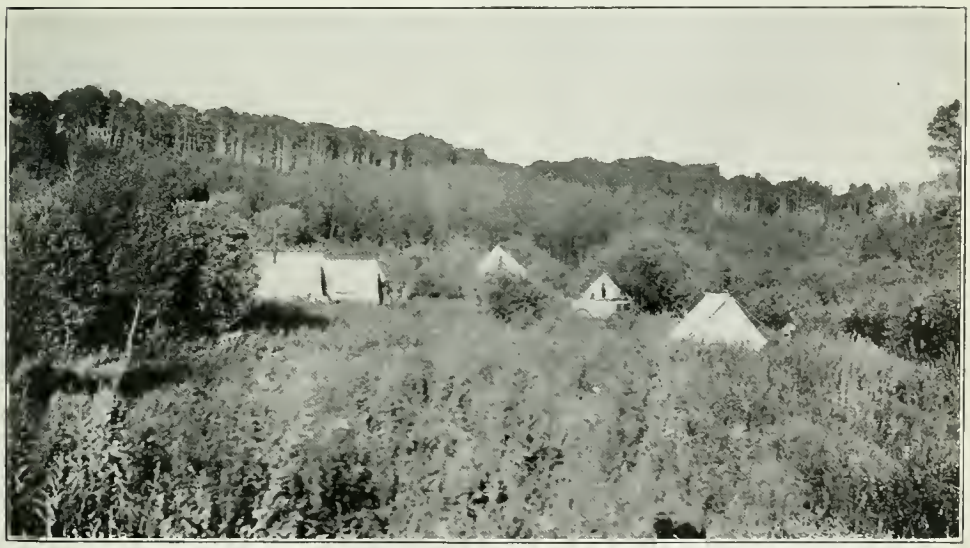

Photo by J. R. Akins, D.L.S.

CAMP ON MEANDER CREEK—PEACE RIVER DISTRICT.

This view illustrates the open country found along the Hay River trail. Meander creek crosses the base line in tp. 112–20–5 and empties into Hay river farther north. Cherries and saskatoon berries grow in great profusion. The same kind of country extends almost all the way from Vermilion to the Hay River post, a distance of 100 miles. At places, the open country is several miles wide.

Hayes river too has frequent rapids, but with a much larger discharge. Its available horse-power would therefore greatly increase the estimate for this northern country.

Very little can be expected in the line of merchantable timber. The construction of the Hudson Bay railway will require much tie timber, and a great many piles, but the greater part of these will have to be brought in by rail. Port Nelson too will require an enormous amount of pile and crib timber, and this also will have to be brought in, although the railway company has been attempting to take out some logs along the Kisemaguskun river.

In the western part of the territory covered by the survey, rock outcroppings occur at frequent intervals. The shore-line of the larger bodies of water such as Sipiwesk, Landing and Split lakes is largely solid rock. Rock outcrops along the Nelson as far down the river as the last limestone rapids. Below this point the banks are clay. This entire absence of rock throughout the district for sixty miles surrounding Port Nelson, is going to be a serious handicap in the construction of harbour facilities. A belt of Huronian rock carrying narrow quartz veins outcrops on some of the islands in Split lake; but whether larger veins carrying mineral values will be found later can be determined only by careful prospecting.

Brief mention might be made of the abundance of fish to be found in portions of the country traversed. Landing, Split, Butnau, Moosenose, and Fox lakes abound in beautiful whitefish, while in Kettle, Sipiwesk and Angling lakes they are to be found in smaller numbers. Sturgeon can be caught in Sipiwesk and Angling lakes and in Nelson river, and trout below Kettle rapids. In the fall, before the ice starts to form, immense schools of a kind of herring come up the mouths of Nelson and Hayes rivers. No attempt has been made to catch these at Port Nelson, but many of them are put up for winter dog feed at York Factory. During certain periods in the summer numerous white whales enter the mouth of the Nelson going up with the tide and down with the ebb.

Since the spring of 1914 the means of entrance to this district has completely changed. With the extension of the Hudson Bay railway to Manitou rapids practically all travel into this district will be by rail. On March 27, 1915 the steel was laid about 220 miles beyond Pas, and should reach Manitou by June. The bridge across the Nelson at this point will probably require the remainder of the summer to complete. Therefore travel to Port Nelson will still follow the river from Manitou rapids. The current from there on is very swift with very frequent dangerous rapids to pass, so that none but experienced canoemen should undertake the trip. The trip up-stream from Port Nelson is very arduous, and considerable tracking is necessary.

APPENDIX No. 37.

ABSTRACT OF THE REPORT OF H. S. HOLCROFT, D.L.S.

SURVEYS AT FORT CHURCHILL.

To reach Fort Churchill we travelled from Pas by construction train on the Hudson Bay railway to the end of steel, a distance of about eighty-five miles. From there we travelled with two hired teams and five dog teams to the end of the tote road, about 155 miles farther; at this point the teams turned back and we proceeded with dog teams along the right of way. When this could be no longer followed we struck across country toward Port Nelson. The country became rougher and more hilly, and our progress which was from ten to thirty miles daily, depended prineipally on the depth of the snow. Sometimes we were forced to lay up on account of windstorms, as the temperature was considerably below zero and the snow was deep. Even with these precautions every one was badly frost-bitten on the trip. Close to Port Nelson the woods became lighter and we had some difficulty in getting dry wood for night camps. We rested the dogs at Port Nelson for a few days and resumed our journey on April 5. As we had a good Cree guide we took a direct line to Fort Churchill, not following the coast, as is usually done. At first the snow was deep and no trail was open, so we made poor time, but on the following day we began to strike the open places in the barren lands, and as the snow there was beaten hard by the constant northwest winds, travelling improved.

We passed over a considerable area of barren lands during the trip to Fort Churchill, and as the wind was frequently blowing we were delayed four days, during which time we had to remain in our tents. Fortunately the guides knew the country and camped at places where we could get a little shelter and lots of dry fire-wood. We arrived at Fort Churchill on April 13.

It was not yet possible to start the survey, so we stayed with the Mounted Police on the west peninsula and employed our time in getting firewood for my intended summer camp across the harbour on the east peninsula.

On May 28, I started to survey the townsite on the east peninsula, but I could do very little work, as the weather was very stormy and the snow too deep. It was not until after the first week in June that we could work regularly, and all during the summer there were frequently stormy days on which we could not work at all. The wind blew almost continuously and we had considerable rain. We had a snowstorm on June 10, and on the 12th there was so much snow that we had to wear snow-glasses.

After having completed the survey on the east peninsula, I moved across the river by canoe and again stayed at the Mounted Police barracks. From there I laid out the property for a police reserve and resurveyed the Hudson's Bay company's claim, about four miles south of the police barracks.

The Hudson's Bay company's supply boat arrived on August 20 and as I had completed the necessary work, I decided to go on it to York Factory, and at Port Nelson get an outgoing steamship to North Sydney, Cape Breton.

I accordingly sold my dogs and outfit to the Hudson's Bay company at Fort Churchill, and left by boat for York Factory on August 25, arriving there the following evening.

On September 3, the Royal Northwest Mounted Police whaleboat took us to Port Nelson, about twenty-five miles around by the sea, and on the following day we boarded the steamship *Sheba* and sailed about noon on the 5th.

We arrived at North Sydney on the 14th and stayed there two days waiting for transportation and cash. I then paid off the party and gave them tickets to Winnipeg and proceeded to Ottawa myself.

The country around Fort Churchill is almost barren, though near Churchill river there is considerable spruce and some tamarack. The townsite on both peninsulas is barren, being either rock or rough country, mostly gravel. Grass grows in some places, principally around the edges of rivers and lakes.

We saw many small birds of different varieties, such as robins, song sparrows, etc., and large birds such as rooks, a few crows and owls. Geese and ducks of all northern varieties, snipe, plover and woodcock were also plentiful.

The summer is short in this district, beginning about July 28 and lasting only about six weeks. The spring is cold and wet, but the climate seems to be healthy.

APPENDIX No. 38.

ABSTRACT OF THE REPORT OF W. J. JOHNSTON, D.L.S.

SURVEYS IN KAMLOOPS DISTRICT, BRITISH COLUMBIA.

The work on which I was engaged during the past season lay principally in the vicinity of Sicamous.

From Enderby we travelled east to tps. 18 and 19-6-6 where we ran some subdivision lines, traversed Hidden lake and surveyed three miles of the south limit of the railway belt. We then went to Mabel lake and subdivided parts of tps. 19 and 20-5-6. Mabel lake affords some excellent fishing and game was plentiful in the vicinity, twenty deer and a few bears being seen by our party.

Leaving Mabel lake on July 6 we moved to tp. 21-12-6. While in this vicinity we laid out a park site for the Chase Board of Trade, traversed part of Chase creek and subdivided parts of townships 21, ranges 12 and 13. This work was completed on July 27.

Chase creek runs through a canyon 1,500 feet deep on one side and 500 feet on the other. A good road runs from Chase as far as Chase creek in sec. 30, tp. 21-12-6 where it divides, one part going south to China valley, and the other east to Squilax. Both roads are in good condition. The soil is a sandy loam and very dry. There is very little rainfall and irrigation will have to be adopted for better results in farming operations.

On July 28, I moved to Malakwa, in tp. 23-6-6. The work in this township consisted of subdividing the sections into legal subdivisions. Work was done also in townships 22, ranges 6 and 7. In all, about fifty miles of subdivision and retracement were run in these townships. Eagle river runs through all three townships, and the valley is about a mile wide on either side. I was able to move my camp by wagons, hired locally, as a good wagon road runs from Solsqua to Craigellachie.

On September 8, having completed this subdivision, I moved camp by rail to Revelstoke, where I obtained three large canoes and commenced a stadia traverse of Columbia river and islands, from Revelstoke to the southern limit of the railway belt. This was completed on October 12. While on this work some subdivision was done in tps. 22 and 23-2-6 and in tp. 22-1-6. Several sections were cut up into legal subdivisions. A wagon road is being built from Arrowhead to Revelstoke, but it will not be completed for several years. There are quite a number of settlers, along Columbia river, who are gradually getting their homesteads cleared. The soil is a sandy loam, suitable for general farming.

My next work was in tp. 23-1-6 which was reached by wagon from Revelstoke. Section 31 was surveyed into legal subdivisions. Most of the township is mountainous.

On completion of this work, camp was moved by rail to Chase where I divided my party, one assistant going south by wagon to tp. 20-12-6 where a school-site was laid out on Charcoal creek, while the remainder of the party went by launch to Celista in tp. 23-10-6. A townsite was laid out along Shuswap lake in section 9, through which a new government road runs. The land in this township is being rapidly settled.

On October 27 camp was moved, by launch, to tp. 22-12-6. The boundaries of section 26 were retraced and re-established, and the left bank and islands of Adams river were traversed. The course of this river has changed considerably since the last traverse was made, and these changes have formed several islands in Little Shuswap Lake Indian reserve No. 1. On October 31 I moved camp to Chase by launch, and disbanded my party, and the following day with one assistant, I left for Revelstoke, where I made a tie between a concrete longitude monument and the east boundary of sec. 34, tp. 23-2-6.

On November 5 I returned to Vancouver, having completed my season's work.

APPENDIX No. 39.

ABSTRACT OF THE REPORT OF G. J. LONERGAN, D.L.S.

INSPECTION OF SURVEY PARTIES WORKING UNDER DAILY PAY.

My first work was in northern Manitoba in the vicinity of Pas.

This town has now a population of about 1,500 and is equipped with modern improvements such as waterworks, a sewage system and electric lights. The Finger Lumber company has there one of the best equipped sawmills in western Canada, employing about 300 hands. Most of the logs are brought in on Saskatchewan river.

The Hudson Bay railway has in operation a mixed train service from Pas to the end of steel, about 170 miles north, and the grade is completed about sixty miles farther. The country from Hudson Bay Junction on the Canadian Northern railway to about 160 miles beyond Pas is mostly low and flat and is covered with about two feet of moss. The timber on this area is mostly scrub, spruce and tamarack with occasional poplar ridges. Some spruce is large enough for milling. Many lakes are scattered through this district and all of them contain fish. No trails of any consequence exist and horses are of little use. Transportation is carried on by means of dogs in winter and canoes in summer.

When the work in northern Manitoba was completed I went to British Columbia and inspected eight parties working in the railway belt. Upon the death of Mr. A. E. Hunter, D.L.S., who was drowned in Nahatlatch river, I took charge of his papers and placed his assistant, Mr. W. H. Norrish, D.L.S., in charge of the party.

I then returned to the prairie provinces and inspected a number of parties working there. I visited in all thirty-one survey parties, investigating all details such as the kind of board supplied to the men, the suitability of the men for the work they were performing, the condition of the transport and the price paid for it, the manner in which the field work was performed and the condition of the field notes and diaries. All the chains were tested and the condition of all instruments used was reported on.

In travelling over the country I was agreeably surprised to find that large areas of land which eight or ten years ago were only grazing leases are now dotted with homesteads; old trails which used to run across the country are replaced by graded roads which follow the regular road allowances; old fords of creeks are now substituted by steel bridges, and many towns have sprung up and become business centres. Telephones are installed in most of the farm houses; rural mail delivery has been established and all the communities show progressiveness. Farmers are also going into mixed farming to a great extent and are erecting more comfortable dwellings and outbuildings. The planting of trees and shrubs is also receiving more attention, and some of the homes have a very attractive appearance.

APPENDIX No. 40.

ABSTRACT OF THE REPORT OF H. MATHESON, D.L.S.

TOPOGRAPHICAL SURVEYS NEAR JASPER.

Jasper is situated in tp. 45-1-6, on a broad flat near the junction of Miette and Athabaska rivers. It is the administrative centre of Jasper park, and is on the main lines of both the Grand Trunk Pacific and Canadian Northern railways, being the second divisional point west of Edmonton on the Grand Trunk Pacific. It consists of a fine park administration building, artistically constructed of boulders, also three stores, and numerous small but generally attractive dwelling-houses. The tents and rough shacks built during the days of railway construction, before the townsite was surveyed, are gradually disappearing. The population of Jasper consists mainly of people employed by the Parks Branch and employees of the Grand Trunk Pacific railway.

In the latter part of 1913, I had commenced the survey operations necessary to make a topographical map, on a scale of ten chains to an inch, of an area in the valleys of Athabaska and Miette rivers, approximately five miles below and five miles above Jasper, and had surveyed many of the lakes and waterways, by means of the transit and stadia. In 1914, I completed the work, using a plane-table.

My topographical surveys were controlled by the section lines of the township subdivision. The sections were divided into smaller areas by transit stadia traverses. The section lines and traverses were plotted on the plane-table sheet in camp, and the elevations of the stations marked. The stations were then occupied by the plane-table. Stadia readings were taken on suitable points with the telescopic alidade, and the points plotted on the plane-table. The stadia readings were reduced in the field by means of a slide rule, and the contours were sketched on the map in the field. The table was oriented by means of the magnetic needle. Besides occupying stations already located, traverses were also run by plane-table and stadia, closing on the transit traverses or section lines. By these means the whole area was surveyed and contours with intervals of ten or twenty feet, depending on the nature of the country, were accurately located. Shores of lakes and rivers were traversed by transit and stadia, and plotted on the plane-table sheets in camp. As data for levelling, I used the Grand Trunk Pacific railway bench-marks. From these, lines of levels were run along roads and trails throughout the area surveyed, and bench-marks were established on which I checked my traverses whenever convenient or necessary. The plane-table work required four men, consisting of a topographer, a recorder and two rod men.

During 1913 and 1914 much development work was done in Jasper and vicinity by the Parks Branch. The streets of the town have been graded and gravelled, and a wagon road has been constructed to Patricia and Pyramid lakes, two magnificent sheets of water more than a mile long in the hills north of Jasper. An excellent automobile road, which winds by many beautiful small lakes, has been constructed as far as Maligne gorge. Pack-trails have been constructed almost to the summits of Goat and Maligne mountains, to Caledonia, Cabin, Medicine, Maligne and Jack lakes, and to many other parts: a temporary wooden bridge has been constructed cross Athabaska river near Jasper. Packers and guides, competent and fully equipped to take charge of tourist parties, are now located at Jasper, and it is possible to travel comfortably from Jasper road along good roads and trails into some of the finest mountain scenery in America.

The area surveyed included the flats of Athabaska and Miette rivers, and the rolling country between these flats and the mountains. One of the most noticeable features of the area is the large number of small lakes scattered over it. This is, of course, an important asset to the attractions of the district, and full advantage is being taken of it by the Parks Branch in the development of this part of the park. All roads are so located that they touch at least a portion of the shore of every lake situated in the general direction of the road. Many of the lakes have no outlet or inlet, and are only large ponds, while others have outlets and inlets either on the surface or underground, and some of the latter contain fish. The best fishing is to be found in Caledonia lake, which in summer is visited almost daily by residents of Jasper and by tourists. Pyramid lake and Athabaska and Miette rivers also provide good fishing.

Maligne gorge, a narrow canyon on Maligne river, is one of the most important scenic attractions in the vicinity of Jasper, and is included in the area surveyed. Its distance from Jasper by road is about ten miles. Maligne river flows northeasterly from Maligne lake, and enters the Athabaska about four miles below Jasper. The gorge is about a mile above its mouth, and just above the point where Maligne river enters the flats of the Athabaska. The gorge, which is approximately half a mile in length, is in places not ten feet wide at the top, but has been eroded by the action of the river water on the soft sedimentary rock to a depth of more than a hundred feet. The river enters it by a cataract and a fall of about seventy-five feet. It is remarkable that only a small portion of the water of Maligne river flows through the gorge. The stream flowing through the gorge is only about twenty feet wide in high water, above its entrance to the gorge, and it is said to become dry in winter. The main volume of the water flows underground about eleven miles from Medicine lake to a point just below the gorge, where it comes to the surface and with the water which flows through the gorge, forms a river about a hundred feet wide. Near the gorge, a rest house has been built, and a trail has been constructed leading up to Medicine, Maligne and Jack lakes. A foot bridge has been constructed across the gorge in such a position as to afford a good view of the falls and the bottom of the gorge.

I completed topographical work in the vicinity of Jasper on October 21 and then moved my outfit to Pocahontas by train. Thence I moved by wagon to tp. 49-26-5 where I surveyed a block of land consisting of eleven legal subdivisions, to be leased to the Northern Alberta Coal syndicate. It was necessary to run nearly six miles of section lines, on most of which the cutting was very heavy.

I completed the above work on November 3 and disbanded my party, and after surveying a corral near Jasper, and placing some iron posts in Jasper townsite, I closed operations for the season.

APPENDIX No. 41.

ABSTRACT OF THE REPORT OF P. MELHUISH, D.L.S.

SURVEYS IN THE NEW WESTMINSTER DISTRICT, BRITISH COLUMBIA.

My season's surveys were begun at Bedwell bay where I retraced road traverses, and marked lot and block corners of the additional subdivision at Woodhaven.

On June 2, I moved to Pitt lake to make a survey of a parcel of land in secs. 18 and 19, tp. 5-4-7. This land was required for industrial purposes, water-power being available from Raven creek.

We next moved to Harrison Mills in tp. 3-30-6 and produced the Seventh meridian northerly to the northwest corner of section 29. After completing other section lines to the north of Harrison bay, and retracing the boundaries of Harrison River Indian reserve No. 3, we ran the east boundaries of sections 21, 16 and 17, and the north boundaries of sections 15 and 16, over the mountain between Harrison bay and Fraser river. Part of my work in this township was to traverse both banks of the Fraser and all the islands in the river which had not been previously surveyed. At this time, however, the river was in flood, and I considered it would be more expedient to do this work later in the season when the river would be easier to cross.

On July 20 I moved from Harrison bay to the south end of Harrison lake, where I pitched camp in tp. 4-29-6. Several section lines were surveyed and retraced in this township and a small parcel of land was surveyed on the west shore of Harrison lake. This land was required for the building of a summer house and is very desirable for this purpose. Some good land in sections 12 and 13 has never been cleared. There is a hotel and a small village at Harrison Hot Springs and motor stages meet the trains at Agassiz station.

The next work, in tp. 3-28-6, consisted in traversing a part of Maria slough and running section lines to close this traverse. There is some good soil in the west halves of sections 24 and 32; the land is all on the mountain sides but the soil is a deep chocolate loam. In the middle of August it contained ample moisture, after six weeks of dry weather. The mountain side has been burned over and there is a fairly heavy growth of birch and alder. The land around Agassiz is being steadily improved and presents the appearance of a thriving community of farmers. On August 14 camp was moved to Fraser river in section 18. From this camp four islands in the river were surveyed in sections 15, 16 and 18.

On August 19 I moved the party back to Harrison Mills where the work which I had left a month before on account of the water being at its height, was taken up again. Some ten islands in the Fraser, and the banks of the river in sections 23, 24 and 13 were traversed. Several section lines were surveyed and corners which had been washed away by the river were re-established in safe places. The action of Fraser river in removing land from one place and building it up in another is extremely rapid and difficult to predict. The river drains a large snow-covered area and is very swift. The last abnormally high water was in 1904, and owing to dredging operations near the mouth, similar conditions are not expected to occur again. The fact that there is a possibility of almost any of the islands in the river being flooded has probably been the cause of settlers not taking up this land. The soil on the islands is sandy loam, but with proper cultivation it would be suitable for agriculture.

The sequence of growth on land which is being built up on the Fraser seems to be invariably the same, namely: willow, alder, cottonwood and cedar. Some of the islands have very large cottonwood trees whose roots help to hold the soil in its place. Cottonwood is valuable, and when dry is hard and almost impossible to split. It is used for making furniture and boxes. There is a sawmill situated in tp. 24, E.C.M., which saws this wood exclusively.

On September 20 I moved camp from Harrison Mills to Coquitlam river to survey timber berth No. 562 and also part of the north boundary of tp. 39, W.C.M. The northeast corner of section 33 was 3,000 feet above the camp. The berth contains some very fine cedar, ranging from two to six feet in diameter. There is a heavy growth of sound hemlock, but the fir is scattered. Logging roads can be built through the berth, as the ground in most places is not unfavourable to logging operations. While surveying this timber berth the rain and fog rendered the work exceedingly slow. This district has an exceptionally heavy rainfall. During the time that we were there, between September 21 and October 25, inclusive, the total rainfall at Coquitlam lake was 18·53 inches. The survey of the berth was finished on October 25, when the party was moved back to Harrison Mills. Camp was pitched in tp. 3-30-6 and that part of Queen's island situated in this township was traversed, together with the right bank of Fraser river in sections 9, 15 and 16, and the left bank in section 14.

On October 31 the party was moved to Harrison Mills and paid off, and after correcting the position of some posts on the resurvey of Langley townsite I closed operations.

The weather in the months of June, July and August was very good for survey operations, but rather too dry for the farmer. The rainy season started on September 7 and from that time on more rain than usual fell. From April 23 to September 6 three days were lost on account of rain, while from September 7 to October 31 twelve days were lost.

APPENDIX No. 42.

ABSTRACT OF THE REPORT OF R. B. McKAY, D.L.S.

LATITUDE OBSERVATIONS IN NORTHERN ALBERTA.

During the past season I observed for latitude on the Fourth meridian near lake Athabaska, on the Fifth meridian near where it crosses Peace river, and on the Sixth meridian near the 21st and 23rd base lines.

The party consisted of myself and one assistant, and for transport we had a canoe, a small dingey and a portable gasoline motor which could be readily attached to the dingey.

Leaving Athabaska on May 8 we overtook the Hudson's Bay company's transport at Grand Rapids, and transferred our outfit to their scows for transport through the rapids. We reached McMurray on May 23, where we left the Hudson's Bay company's scows and proceeded down the river in our own boats, reaching lake Athabaska on the 30th.

The ice on the lake detained us for a few days, but on June 6 we left for the Fourth meridian, and, after travelling through twelve miles of ice, reached the meridian five days later.

The land in this vicinity is fairly level, dry and sandy, and is partly covered with jackpine, which has recently been burnt over. Several small hay meadows lie along the valley of a creek which enters lake Athabaska near the meridian. These places appeared to be a breeding ground for mosquitoes which were very plentiful, active and annoying during my stay at the meridian. Foxes are quite numerous in the district, but no other game was noticed.

I completed my observation here and started for Chipewyan on June 27. The water in the lake was considerably higher than it had been two weeks previous, and not so clear, as Peace river was sending large quantities of drift-wood into the lake. Being favoured with calm water, I reached Chipewyan on June 28, making the trip from the meridian in seventeen hours actual travelling.

Chipewyan is a trading centre for the Chipewyan and Cree Indians who trap and hunt in the vicinity of lake Athabaska. The land included in the settlement is very rocky and although a few patches of potatoes are grown, very little of it can be used for gardening. There is plenty of game and fur in the district and the lake abounds in fish, thus making it an ideal country for a hunter or trapper.

On July 4, I left Chipewyan for the Fifth meridian on the Hudson's Bay company's steamer *Grahame*, which was making its annual trip to Vermilion chutes on Peace river. The route taken to reach Peace river was through the Quatre Fourches channel which is about 200 feet wide and connects lake Athabaska and Mamawi lake with Peace river. The country it runs through is low and flat, and timbered with patches of good spruce, while large quantities of hay are found around the shallow lakes to the west. The lower part of Peace river traverses a rich agricultural country, and its banks and the islands in the river are well timbered with spruce, birch and poplar, and vast prairies with unlimited hay meadows exist a short distance from the river on either side. Large quantities of gypsum are exposed in many places on both banks, particularly near Peace point. At what is called Little rapids, the current is very swift while the water is shallow with a gravelly bottom; these rapids, however, are navigable except at low water. The banks as a rule are low and are frequently

undermined by the strength of the current at high water, which occurs in the latter part of June. I left the steamer *Grahame* about six miles west of the Fifth meridian and with my outfit drifted down stream to the line, choosing the place of observation on the north bank of the river. The current there is about three or four miles an hour, and the banks which are well timbered with spruce, birch and poplar, are about twenty feet high. Thunderstorms and showers were quite frequent during my stay, and the aurora was very beautiful.

On July 27, I completed my observation, loaded the outfit in the canoes and started up Peace river, using the motor. We reached Red river, where there is a small settlement, on the 30th, and the same evening camped on the south bank of the river at Vermilion falls. There it was necessary for us to portage our outfit, but, as the water was low, we were able to get within ten feet of the falls and portaged the outfit about 100 feet. Between the falls and the rapids a distance of about a mile and a half, we tracked the canoes singly as the current is very swift, and again portaged the outfit a distance of about 300 feet over the rapids. In these falls and rapids there is a drop of about twenty-five feet. They constitute the only obstruction to navigation on Peace river below Hudson Hope. They could be made the source of a great amount of power, but there is no market for it at present. There is a road extending from Red river to Steamboat landing, a mile west of Vermilion rapids, over which the Hudson's Bay company transport the freight from one steamer to another, and during this season surveys have been made for a proposed tramway on the north side of the river to overcome these falls and rapids.

Near Vermilion rapids on the south side of the river, a few settlers were clearing land at the time of my visit. Above the rapids the current is swift for about a mile, and then slackens considerably. On August 4 we reached Fort Vermilion, where I decided to await the arrival of a steamer which was expected shortly. The vast stretch of level country in this vicinity has great agricultural possibilities, and a visit to Mr. Jones' experimental farm will convince one that all kinds of grain and vegetables can readily be grown and ripened in this section. However, the majority of the settlers are trappers and hunters, and do very little farming. On August 14 there was a slight frost at Fort Vermilion, the first of the season. I left there on the steamer *Peace River* and reached Peace River Crossing on August 19, after having travelled over 1,100 miles by water.

At Peace River Crossing Mr. A. L. Cumming, D.L.S., who was working in the vicinity, furnished me with his packer and four horses, which, together with five others, constituted the pack-train by which I was able to transport my outfit to the location of my next work on the Sixth meridian, near the 23rd base. To reach this place an old trail, which passed near the easterly end of Bear lake, was followed as far as section 10, township 87. We then travelled westerly along section lines to the meridian and northerly on the meridian. The heavy windfall in township 88 necessitated considerable cutting before the line was made passable for the horses. The place of observation was reached on September 5 and I completed my observation on the 18th, the following day from twelve to fourteen inches of snow fell, the weight of which broke many trees, mostly poplar and birch, in the vicinity, and made travelling difficult. I returned to Peace River Crossing for supplies on September 27, and then left for the Sixth meridian near where it crosses Peace river, which was the location of my next work.

I reached the place of observation on October 3, and being favoured with good weather I completed my observation and returned to Peace River Crossing on the 15th.

APPENDIX No. 43.

ABSTRACT OF THE REPORT OF J. H. McKNIGHT, D.L.S.

STADIA SURVEYS IN EASTERN SASKATCHEWAN.

We commenced operations for the season by traversing Big Quill lake in tp. 35-17-2. We found the water in this lake to be very high, and as the land rises gradually from the lake, a slight change in water level greatly alters the shore line. After completing the traverse of the lake in this township, this work was postponed on account of the high water.

Investigations were then carried on in tps. 35 and 36-19-2, and tp. 36-18-2. This district is well settled, and the roads are well graded and in good condition. The crops were very good, although the summer season was hot and very dry.

During July townships 37 and 38, ranges 18 and 19, and townships 36, 37 and part of 38, range 17, were investigated. Through this district the only good roads run north from Englefeld, Watson and Wimmer railway stations, and some difficulty was experienced in finding trails running east and west. The country is partially settled, and there is considerable poplar bush for firewood and building purposes. An abundance of hay grows around the lakes and sloughs, and on the higher land there is a rank growth of peavine and other grasses. These townships are especially adapted for mixed farming.

Townships 36 and 37, range 16, township 36, range 15, and township 35, range 14, were next investigated. The country is covered with large areas of small poplar and willow, and is suitable for mixed farming.

On August 15, I moved camp to Fishing lake in tp. 33-12-2, and also investigated townships 31 and 32. This district is well settled and the farmers are very prosperous. Nearly all have gone in for mixed farming or ranching, especially cattle ranching. Most of the hay for winter feeding is obtained around Foam lake, where there are large areas of splendid hay land, from which hundreds of tons of hay are cut each year. This work was completed on September 8.

We then proceeded to investigate the fractional sec. 7, tp. 33-18-2, going by way of Quill Lake settlement for supplies. This township is gently undulating prairie and is fairly well settled. The crops were below the average owing to the dry season and an early frost. The water in Big Quill lake was still very high and no other traverse was made in the township.

The next work was the investigation of tp. 37-15-2 and part of Ponass lake in tp. 38-14-2. This finished our work in this district.

On September 28 we left to make a traverse of Connell and Harehills creeks, on the west boundary of the Pasquia Forest reserve. From tp. 40-5-2 I followed the summer trail which runs northwesterly through a heavily timbered country and crosses Barrier river on the Kinistino Indian reserve. I then proceeded through a settled country to Arborfield in tp. 47-12-2, by way of Tisdale, a busy town of 350 population. The roads through this district are nearly all graded and in good repair. Prairie and bush fires were burning throughout the country, doing considerable damage, but were checked and stopped by rains commencing on October 2.

From Arborfield I took a winter road, newly cut out, to Connell creek in tp. 48-10-2. Owing to difficulties in making this traverse, and wet weather, this work was not completed, and on October 12 I closed operations for the season.

APPENDIX No. 44.

ABSTRACT OF THE REPORT OF W. A. A. McMASTER, D.L.S.

RESURVEYS IN THE PRINCE ALBERT DISTRICT.

My first work for the season, which was commenced on July 16, was the resurvey of tp. 46-25-2. This work did not make very rapid progress, as nearly all the monuments were lost or obliterated; it was, however, finally completed on August 24. The Canadian Northern railway runs through sections 32, 33, 28 and 21 of this township, and a ferry crosses Saskatchewan river at the southwest corner of section 22.

After completing this work I left for Sturgeon lake to survey a part of tp. 51-1-3. This lake which is an expansion of Sturgeon river crosses Sturgeon Lake Indian reserve No. 101 which covers the central and southeastern parts of the township. It is a long narrow body of water and is dammed at the east end to store water for driving logs down Sturgeon and Shell rivers. When I was there the sluice was open so that the lake was at its normal level. The rainfall in this district was abundant, as it rained every day except one while I was there.

I next moved to tp. 47-28-2, and after retracing this township I retraced parts of tps. 47 and 48-27-2, the north boundary of tp. 47-26-2 and Prince Albert settlement as far east as river lot 54. I ran trial lines as far as river lot 75 but only temporary monuments were planted.

River lots 55 to 59 inclusive of this settlement form part of the Saskatchewan Penitentiary reserve, and all east of this is occupied by the city of Prince Albert. The surface is generally level or inclined to be rolling. About thirty per cent of the land is covered with poplar and willow, about one-half of which has been killed by fire. The rest is open prairie or has been cleared. The soil is sandy loam, and is well adapted for farming or market gardening. The settlers are engaged in mixed farming and dairying, both of which appear to be a success. Some sloughs, most of which have hay land around them were seen, but no timber grows except poplar up to six inches in diameter, which is fit only for fuel. Saskatchewan river runs along the north of the settlement, and two small creeks flow into it. One crosses the Third meridian about a quarter of a mile south of the base line and runs in a northeasterly direction, the other runs through river lots 15 to 18, also in a northeasterly direction. Each is about ten links wide and has a valley about fifty feet deep. At the time of survey neither was running. There is a descent of about a hundred feet towards the river and the land below is flat and wooded with small poplar and willow, except where it has been cleared. The slopes are generally easy, but where steep they are wooded with poplar, birch and some spruce. The climate was mild and the rainfall sufficient. Jumping deer were noted and also one bear. Of the fur-bearing animals, coyotes, foxes, and muskrats were seen. Ducks, partridges and chickens were plentiful.

About an inch of snow fell on November 6, and on the 12th it came to stay. On that date I ceased operations for the time being, and discharged the party. On February 11, 1915, I commenced the traverse of the river through the settlement beginning at the Third meridian and working east. I completed this traverse on the 15th.

APPENDIX No. 45.

ABSTRACT OF THE REPORT OF A. M. NARRAWAY, D.L.S.

OUTLINE AND BASE LINE SURVEYS EAST OF LAKE WINNIPEG.

My work for the past season consisted of the survey of the north boundary of tp. 20-10-E, and of a continuous line made up of base lines and township outlines from township 48 on the Principal meridian south to tp. 37-3-E.

We left Selkirk on May 16 and proceeded by boat to Little Black river in tp. 21-9-E. We paddled up this river to our first work in tp. 20-10-E.

Little Black river at its mouth is about twenty chains wide and eight feet deep. About a mile from lake Winnipeg the north and south branches join. The former contains about twice as much water as the latter, but both of these branches are navigable for canoes, although in many places fallen trees have blocked the channels.

When this work was completed we travelled by steamer to the mouth of Big Black river, and on June 8 commenced work at the northeast corner of township 48, on the Principal meridian. We surveyed the 13th base line, first west to the lake shore, and then east across range 1, east of the meridian. From there we turned south and surveyed the east boundary of range 1 to the 12th base, and thence east along this line across ranges 2 and 3.

Big Black river varies in width from four to eight chains, and contains very dark soft water, indicating muskeg origin. It is navigable for tugs for about four miles from the mouth. Lake steamers call at this river during the fishing season. This year the water was very low, and the large steamers had some difficulty in passing over some hidden reefs in the channel.

In township 46, Poplar River Indian reserve and Poplar river itself were crossed in sections 36 and 25. There is a strip of good land along the river in this reserve, most of which is still covered by trees, and few gardens were seen. The Indians whose homes are on this reserve spend most of their time during the summer at Big Black river, where a few of them work for the fishing companies.

Poplar river is about three-quarters of a mile wide at its mouth, but narrows upstream to an average of about five chains. There is no perceptible current and not many rapids, making it a very serviceable river for transporting supplies. It is not very deep, and only tugs can enter it. It passes through a large lake lying partly in tp. 44-6-E. This lake is known as Thunder lake, deriving its name from an old Indian legend concerning a high rock ridge a short distance to the south of the lake. From this ridge the country can be seen for miles around. It seems that there are some large boulders piled on this ridge which resemble a huge nest, and it is claimed that young thunder is born there, and that it can be heard echoing and re-echoing among the rocks.

On August 29 we turned off the 12th base line and surveyed the east boundary of range 3 as far as township 37.

In township 44 our line crossed the west edge of Manybays lake. This lake is about three miles long, lying in a southeasterly direction, and drains into Poplar river from its east end by underground connections. There is considerable open floating muskeg around the lake and many rock ridges covered by jackpine and spruce. Many ducks were observed on this lake.

Leaf river which crosses the line in township 41 averages about three chains in width and fifteen feet in depth. It is a very pretty river, and very appropriately

named. Its mouth during a season of low water on lake Winnipeg, is usually blocked up by a shifting sand-bar, which leaves a channel only about twenty feet wide and a few inches deep. At high water sail boats can enter from the lake. There are a great many rapids up-stream. Some promising stands of spruce and balsam were seen along its banks.

In sections 25 and 24 of township 39 the line crossed Berens River Indian reserve, and in sections 13 and 12 it crossed Berens river. The Indians living on this reserve were found to be a better class of people than those on the Poplar River reserve, and their homes were better looked after. Some good gardens were seen there and also some very good cattle. This year potatoes averaging 100 bushels to the acre were grown on the reserve. Some of the Indians are good packers as they are used to taking hard trips up Berens river with the Hudson's Bay company's freight.

Berens river has a slight current and varies in width from ten to twenty chains. It is very deep and the larger lake-steamers can run a considerable distance up-stream. Several years ago the government had a fish hatchery there, but this has been moved across the lake to Grand Rapids.

The line in township 38 struck lake Winnipeg in section 25, and crossed Pigeon bay, a distance of about four and a quarter miles. This was passed by means of a triangle.

Pigeon river which empties into this bay is much the largest river crossed by our lines this season, and if a lake-steamer could enter its mouth it is probable that it could run about ten miles up-stream. The mouth of this river is very narrow, being partly blocked by a shifting sand-bar, and no boat larger than a skiff can enter at low water, or a sailboat at high water.

On October 14 having reached the northeast corner of tp. 37-3-E, I closed operations and returned to the mouth of Berens river. From there we travelled by steamer to Selkirk where we arrived on the 21st.

The country covered by our surveys is usually level and is made up of a succession of swamps, muskegs and low rock ridges. As a rule these swamps are covered with a growth of stunted spruce and tamarack, and there is usually standing water on the surface. The muskegs are generally not very deep, and have a clay bottom with more or less muck. There is also a lot of deep moss muskeg which is dry and springy. The growth on this muskeg is generally scattered small spruce.

In some places where the lake cuts the edges of such a muskeg, moss seven feet deep was seen. The rock ridges are usually granite outcroppings often covered with a thin growth of spruce and jackpine.

The rivers entering the lake on the east side are very similar and have little current except at the rapids. In several places Big Black river widens out to nearly twenty chains and then narrows to about six feet, while Leaf river has rapids that can be crossed by a short step. The rivers usually are a succession of basins and short rapids.

Lake Winnipeg is known throughout America for its whitefish and sturgeon, and it was therefore interesting to see the actual fishing operations carried on. This year no sturgeon fishing was carried on owing to close season, but two companies were engaged in fishing for whitefish and pickerel. These companies have fishing stations at Big and Little George's island, Little Sandy islands, Big Black river and Warren's landing. At Big Black river and Warren's landing tugs as well as sailboats are used for fishing. Each company operates a freight and passenger steamer to collect its fish and bring them to Selkirk. These steamers aim at making two trips a week during fishing season which lasts from June 1 to August 15. After this date the Northern Fish company's steamer made one trip a week, carrying passengers. This steamer also calls at Berens river when it has any freight for that locality. During the fall pickerel fishing is carried on from skiffs, the catch being shipped to Selkirk in tugs,

and in the winter whitefish are taken through holes in the ice. Many whitefish are cached in the fall by the Indians for dog feed during the winter.

While moose and deer are none too plentiful on the east side of the lake, yet there are enough to furnish food for the Indians in that district. There seems to be a fair number of fur-bearing animals in this district, including many black and silver foxes. While we were running the 6th base line during May, one of my men was fortunate enough to catch alive two black foxes, for which he received $800.

Throughout the months of July, August and September, numerous forest fires crossed the district in which we were working. In some cases patches of good timber were burned. There are still some promising stands of timber which would be well worth saving, and as it is usually to be found along the rivers, which are well adapted for quick and easy travelling, it could be easily patrolled by firerangers.

Photo by J. A. Fletcher, D.L.S.

RAFTING ON WABISKAW RIVER.

A raft constructed of dry logs held in place by cross pieces firmly lashed in position with cinch ropes, is useful over smooth stretches of river. This raft was large enough to carry the cook outfit and some 1,200 lbs. of provisions; it was floated down the Wabiskaw river from Tall Cree's place to the 27th base line. The men on the raft are carrying long poles for steering.

Photo by J. A. Fletcher, D.L.S.

SWIMMING HORSES ACROSS WABISKAW RIVER.

As no horse feed grew on this side of the river the horses had to be taken to the other side. The men in the canoe are leading one horse and the others are crowded in with a rope.

APPENDIX No. 46.

ABSTRACT OF THE REPORT OF R. NEELANDS, D.L.S.

STADIA SURVEYS IN CENTRAL SASKATCHEWAN.

My season's work consisted principally of the investigation of water areas and the stadia survey of permanent bodies of water in a block of townships about three ranges wide and extending about sixty miles south from Prince Albert. Over thirty townships were examined and all are somewhat similar in character. The surface is rolling and often hilly, covered in places with poplar and scrub and containing many small lakes and sloughs.

In many of these townships the road allowances are not opened up, and in only a few are the roads graded, as the homesteading is recent and some land is still vacant. A great many settlers are Ruthenians and French Canadians, nearly all of whom are engaged in stock raising and mixed farming.

Many of the lakes are alkaline but a few contain fresh water. Muskiki lake, which occupies a large part of the southwest portion of tp. 39-26-2, is saturated with salts, and in dry seasons is nearly viscid. The water is said to be beneficial in treating rheumatism, and the water of Muskiki springs, which are situated on the southeast side of the lake and which form its chief supply, are said to have valuable curative properties. Having finished the work in this block of townships, I left for tp. 44-22-2. The greater part of this township is included in the low area surrounding Waterhen lake and is an extension of Waterhen marsh. Few of the road allowances are opened up, but there is a graded road from Meskanaw, in the southern part of the township, to Kinistino, on the Canadian Northern railway.

On October 12, I moved to tp. 53-7-3, and on completing the work there returned to Prince Albert, where I discharged the party.

In general this whole district is rolling country, mostly covered with small poplar and scrub, and broken with many ponds and lakes. It is drained by Saskatchewan and Carrot rivers. Hay, wood and water are abundant, and it is fairly well provided with roads and railways. It is first-class agricultural land, and farming is the only industry engaged in by the settlers. About seventy per cent of the land is settled by various European nationalities, who seem contented and prosperous.

Although the season was unusually dry and favourable for stadia surveys, few sloughs were completely dry, and only two section lines were retraced and one monument erected. Three hundred and twelve lakes, ninety-nine islands and a part of Saskatchewan river were traversed. Many sloughs and marshes were also investigated.

APPENDIX No. 47.

ABSTRACT OF THE REPORT OF W. H. NORRISH, D.L.S.

SURVEYS IN THE VICINITY OF LYTTON, BRITISH COLUMBIA.

Early in April, 1914, I was appointed as assistant to the late Mr. A. E. Hunter, D.L.S., and upon his death, on July 14, was placed in charge of the party.

The season's work was begun in tp. 11-26-6, where, after completing the necessary subdivision, ties were made to the Canadian Northern railway, which is now constructed from the coast to the bridge across Fraser river, six miles south of Lytton. Part of the left bank of the river was also traversed. Our work was nearly all on the east side of the river, but connections had frequently to be made to posts on the opposite side, necessitating triangulation.

There are four small Indian reserves on the left bank of Fraser river, in this township, and although the benches on which they are situated are small, the land, if properly tilled, would be exceedingly productive, as it has been demonstrated that almost anything can be grown there. Great success is attained with garden produce, including all sorts of small fruits. There are several homesteaders in this township, but most of them are on the opposite side of Fraser river, where the hills do not rise so steeply and where there is considerably more farming land along the river. Some of the settlers are starting orchards which promise fine results. The hardier fruits, such as apples, pears, plums, etc., are practically sure to be a success.

Transportation routes are limited. On the west side of the river a good wagon road runs from North Bend to a ranch about half a mile north of Chaumox siding on the Canadian Pacific railway. On the east, or left bank, the Yale-Cariboo road forms the route for transportation. Although cut up in places by the grading of the Canadian Northern railway, this road is passable through the greater portion of the township. The bridge over Stoyoma creek in section 2 has disappeared and the road has been spoiled by the railway construction south of there.

Our next move was to tp. 12-26-6, where we completed the subdivision surveys necessary to tie in the Canadian Northern railway, and to dispose of the lands recommended for survey, as well as considerable retracement work to define the boundaries of Boothroyd Indian reserves Nos. 5 and 6, and lot 3, G.I.C.G. We also traversed the left bank of Fraser river through the township, where not already done.

The soil is rich, sandy loam on the benches and hollows, and is exceedingly productive, but it should be irrigated to ensure the best results, as the summers are inclined to be dry. It is regrettable, also, that the country is so thickly wooded that an enormous amount of work is required to clear the land, while the timber is poor in quality.

On July 9, we moved northward and across Fraser river to the village of Keefers from where we made the necessary surveys on the west side of the river in township 12, range 26, and began the traverse of the right bank of Fraser river through townships 13, ranges 26 and 27. It was while running the north boundary of section 5 in tp. 12-26-6 that Mr. Hunter slipped over an embankment and was drowned in the rapids on Nahatlatch river. His body was not recovered until eight days later, when it was forwarded to Wiarton, Ont., for burial.

I was then placed in charge of the party and on July 24 again commenced the traverse of the right bank of Fraser river, in township 13, range 27. We finished this work on August 1, and on the 3rd moved camp to Dot station in the Nicola valley,

to commence the second part of the season's work, consisting of surveys in tps. 13, 14 and 15-23-6, and tps. 15 and 16-24-6.

From this camp we made subdivision and retracement surveys in the northern part of township 14 and the southern part of township 15, range 23. In township 14 we completed the survey of the quarter sections adjoining the east boundary of Lower Nicola Indian reserve No. 10, and retraced the east boundary and part of the west boundary of the reserve. We also ran the 4th correction line from the NE cor. sec. 33, tp. 14-23-6, westerly to the SW. cor. tp. 15-23-6. We then subdivided the good lands in the southwest portion of township 15 lying west of Nicola river as well as sections 3 and 10 east of the river. The river was traversed where not already done and part of the east boundary of Lower Nicola Indian reserve No. 11 was retraced. Altogether, the work covered from this camp totalled nearly forty miles.

The country covered was mostly rough timbered hills, but benches of good agricultural land were found on some of these hills. The Nicola valley is very narrow, but what lands there are at the bottom of the valley are very good. The climate is very dry as this district is in the midst of the dry belt, and it is almost imperative that the land be irrigated. This season was exceptionally dry, and most of the streams which usually carried considerable water in the middle of the summer were practically dry.

The timber is mostly fir and pine frequently running up to thirty inches in diameter, and in some places considerably larger. Scrub, poplar, etc., are not as thick as along the Fraser, although we noticed occasional poplar swamps which contain good agricultural lands.

On October 2 we moved from Dot to tp. 13-23-6 and camped near lot 779, abut four miles from Canford post office. In this township the subdivision of sections 27 and 28 was completed and some subdivision done in the southwest portion of tp. 14-23-6. We also retraced another portion of the western boundary of Lower Nicola Indian reserve No. 10.

On October 21 having completed the above-mentioned surveys, we went to Clapperton which is the first station south of Spence's Bridge, on the Nicola Valley branch of the Canadian Pacific railway, and surveyed parts of sections 3, 10, 15 and 16 in tp. 16-24-6.

Practically all of this township seems to be suitable for grazing purposes as the hills seem to bear a fair crop of bunch grass. A high plateau is to be found on the west side of Nicola river, which contains particularly good grazing lands. The hills on the east side of the river, though rising quite steeply for several hundred feet from the river, have afterwards very moderate slopes and are covered with an abundant growth of bunch grass.

The timber is practically all pine and fir, with pine predominating. It is a scrubby variety though growing to a fair size.

We traversed both the right and left banks of Nicola river through the southern half of the township, and also did some retracement of Indian reserves.

I closed operations on November 3.

The weather on the whole could hardly have been better. It was exceptionally dry during the summer although excessively hot at times. Most of the rain fell after September 10 when it began to rain rather frequently.

APPENDIX No. 48.

ABSTRACT OF THE REPORT OF P. E. PALMER, D.L.S.

SUBDIVISION SURVEYS IN NORTHERN MANITOBA.

After organizing my party at Pas, we left on July 4, 1914, by the Hudson Bay railway for tp. 63-13-Pr., where our first work was located.

In this locality subdivision was done in fourteen townships along the railway right of way from township 65, range 13, to township 70, range 7. The work was completed on January 30, 1915. I then returned to Pas and surveyed a small island in tp. 56-26-Pr., after which I closed operations for the season.

Pas is the distributing point for supplies to a large section of northern Manitoba and Saskatchewan. It has a large lumber and fish trade and is also a fur-trading centre. Should the newly discovered mineral areas around Beaver and Wekusko lakes prove valuable, Pas will also be a mining centre. Its present population is about 1,500. Two lines of steamers which ply on Saskatchewan river, furnish the chief connections with the trading posts.

In its general character the country covered by my surveys is but little suited for agriculture, though parts of it could, no doubt, be used at the present time. In this connection it is worthy of note that I saw wheat, barley and oats growing around an old railway construction cache, in tp. 69-7-Pr. The straw was exceptionally long and strong and the grain was well-ripened and not hurt by frost on October 5. I was informed that in 1914 frost came much earlier to the settled parts of Saskatchewan and Manitoba than it did in the country where I was working.

The deposits of peat and muck in the swamps and muskegs in this country are not so deep as those in similar areas farther south. As a rule, this soil is from six to thirty-six inches in depth, and if the country were drained, I see no reason why this land could not easily be brought into a high state of cultivation. There is but little timber in the country covered by my surveys, and that mostly confined to the shores of lakes and banks of creeks where there is drainage. The small spruce and tamarack growing in the swamps and muskegs does not attain sufficient size to be of value, but dies when it reaches a diameter of eight or ten inches. A scourge of green caterpillars visited this locality in August and completely denuded the tamarack of their leaves. This will probably have the effect of killing most of them.

Game is far from plentiful in this country; a few signs of moose, caribou and bear were observed, but only two moose were seen during the entire season. There are a few partridges, pinnated grouse, and ptarmigan, but no great number. Rabbits, however, are abundant, and foxes, mink and muskrats are fairly plentiful, while lynx, otter and marten are more rarely found. Several fine specimens of the black and silver grey fox were captured in this neighbourhood during the early winter. In this connection I would like to call attention to the practice of many trappers in putting out poison for foxes and other fur-bearers. Though this act is illegal, it is done to a large extent by trappers, especially foreigners, who have not the skill to capture their game in other ways. Much of the game so killed is never found, as it is covered by the drifting snow, or else, if found, the pelt is too often destroyed by ravens or mice. In view of our rapidly decreasing supply of fur it would appear that steps should be taken to stop this practice, and to prohibit the sale of strychnine and arsenic for this purpose.

The numerous lakes in this district are nearly all well stocked with whitefish, jackfish, and mullet, and in Pakwa and Setting lakes pickerel are also taken. Several carloads of fish were shipped from Setting lake this winter as well as one from Kiski lake. A small net supplied enough fish for the requirements of my party during a large part of the season.

No trace of minerals was observed during the course of the survey, but the magnetic needle showed a difference in variation of nearly ten degrees between different observation points occupied during the season. A difference in variation of five degrees was observed in one instance where only one mile intervened between the observation points, which would indicate the presence of iron ore in large quantities. These irregularities were noticed to a greater or less extent at all points in my work. East of range 11, ridges of granite occur at frequent intervals. Some small veins of quartz were noticed at various places in these ridges, but no signs of gold were visible. The granite in this locality is said by the engineers of the Hudson Bay railway to be the hardest rock encountered in any part of Canada.

The snowfall in this district was quite heavy, there being about eighteen inches at the time of closing operations. It was noticed that the snow became deeper as one went north, and this I am told is the general rule in this part of the country.

APPENDIX No. 49.

ABSTRACT OF THE REPORT OF R. C. PURSER, D.L.S.

MISCELLANEOUS RESURVEYS IN MANITOBA AND SASKATCHEWAN.

The scattered miscellaneous surveys on which I was engaged during the season of 1914 were mostly in settled districts. The party consisted of myself and one assistant, local help being procured where necessary.

During the season about thirty surveys and investigations were made, the length of time necessary to complete any one survey varying from a few days to three weeks according to its nature. For the most part this work lay in the southern part of the provinces of Manitoba and Saskatchewan, the greater part being in the latter province.

The season throughout was very favourable to our work, but was unfavourable to the farmers in many of the districts, the crops suffering heavily on account of the exceptionally dry summer that prevailed.

A considerable part of our work consisted of the establishing of section and quarter-section monuments in places formerly covered with water but now dry. This work is of considerable benefit to the settlers as it permanently and officially establishes for them corners which might otherwise be in dispute and subject to arbitrary determination by the parties themselves.

In some cases whole lakes of considerable size had dried up since the original survey and in these the section lines were run and the corners perpetuated by monuments. One of these was Whitebear lake lying in tp. 24-15-3 and extending into the surrounding townships. This lake bed was yielding large supplies of wild hay at the time of the survey and already part of it was being made ready for cultivation.

Another class of work of equal importance with the above was resurveys for the purpose of locating corners, the original monuments for which were either lost or not in the position where they should have been according to the official plans of the township. In order to make any correction in these cases it was necessary to conform to section 57 of the Dominion Land Surveys Act which requires the written consent of the owners affected by the alteration. In some cases where this could not be obtained, nothing could be done towards a correction of the existing errors and retracements only were made for the purpose of putting the correct chainages and bearings upon the official plans.

Other work of various natures was undertaken consisting of retracements, investigations and correction surveys of different kinds. Magnetic observations were also taken, both for magnetic dip and total force, in every place where it was possible to do so without interfering with the regular work. My season's work in the field extended from June 1 until the end of December.

APPENDIX No. 50.

ABSTRACT OF THE REPORT OF C. RINFRET, D.L.S.

STADIA SURVEYS IN SOUTHERN SASKATCHEWAN.

During the past season my work consisted of stadia surveys in thirty townships south of Moosejaw, and mostly along the Weyburn-Lethbridge branch of the Canadian Pacific railway.

The district was, in general, well settled, very few homesteads being vacant, and the roads are all in good condition.

The surface is mostly level, though rolling in places, and the soil is well adapted to mixed farming. Water seems scarce in some localities. There was a fair rainfall in townships 9, ranges 21 and 22, but elsewhere it was not sufficient. The district seems well suited for ranching where water for the stock is available.

The district north of Twelvemile lake, just west of the Third meridian, with the exception of a strip about a mile in width along the water, which is cut up by coulees, is rolling and suitable for farming. It is well settled. The southern part is rather hilly, and ranching is more successful; it is yet only sparsely settled, and a number of good homesteads are available.

My last work was in tps. 12 and 13-27-2. These townships are hilly and have many small lakes and sloughs. Ranching is carried on there to a small extent.

Although this district had much less rain this year than usual, 268 lakes and sloughs were found and traversed; the most of them are small, not over three feet deep and had potable water. Generally as soon as the land surrounding these lakes is cultivated the lake beds rapidly decrease in area. Sixty-six section corners previously under water were found dry, and the necessary section lines were run, and the monuments erected.

The crop was poor this year on account of the lack of rain, and what did grow was considerably damaged by a heavy frost early in August.

APPENDIX No. 51.

ABSTRACT OF THE REPORT OF O. B. ROBERTS, D.L.S.

STADIA SURVEYS IN CENTRAL ALBERTA.

On June 1 we commenced our season's operations in tp. 42-9-4. Our work was at first retarded owing to heavy rains and the flooded state of Battle river, which rose eight feet above its normal height, and this flooding together with the heavy growth of bush and undergrowth along the river banks forced me to postpone its traverse through the various townships in which I worked, until a more favourable opportunity should present itself. I decided to wait until the work could be done on the ice, but as I closed operations before that time it was left undone.

The territory in which I worked may, for convenience of description, be divided into groups.

The first group comprises all the territory from townships 39 to 42 inclusive in ranges 9 and 10, west of the Fourth meridian.

This district is very rolling with numerous bluffs of poplar scrub. It becomes gradually less rolling towards the south, until in township 39 the surface is gently undulating. There are numerous sloughs in this block, which produce unlimited quantities of hay.

The soil in township 42 is very sandy and accordingly is not well adapted to farming. Under the most favourable conditions the crops are very light. Farther south the soil becomes heavier, and in township 39 it is too heavy for such low-lying country. Here the crops are very late, and in most cases become frozen before they are ready to be harvested. As a result of these different drawbacks, there is not very much of this block under cultivation. In the southern part of the block, oats is the predominating crop. Barley ranks next, while very little wheat is grown. The oat crop is, in many cases, harvested while yet green, and used as winter fodder for the cattle and horses, the raising of which is the chief industry, as the grazing facilities in this district are unequalled anywhere. The raising of hogs is also an important branch of agriculture.

The railway facilities of this district are about as good now as they are likely to be for many years, except, perhaps in township 39, where the new Canadian Pacific railway branch line from Coronation northwesterly is under construction. This line has been under construction for a number of years and in the opinion of the settlers it is not likely to be completed for some time.

A branch of the Canadian Pacific railway passes through township 42 in this group and at the present time is the only outlet from these parts.

The valley of Battle river is so wide here and so hilly that wagon transportation is quite difficult. The roads are fair and are kept in good repair, although very rolling as is natural from the rolling condition of the country. Two steel bridges span Battle river in this district, one near Hardisty and the other in township 41. From these bridges trails strike out in many directions, following in all cases the lines of least resistance. This plan is greatly simplified by the almost entire absence of fences. There are also very fair trails on either side of Battle river running throughout the district, and giving an excellent outlet from the interior parts of the district to the town of Hardisty.

With the exception of tp. 39-9-4 Battle river traverses all the townships in this district. This stream is very winding and muddy. It is from one and one-half

to four chains wide, and has a current of from one and one-half miles at low water to about five miles per hour at flood. Its valley is very deep, rugged and wide, especially on the east bank where broken country extends eastward for two or three miles. This valley is from 250 to 300 feet deep, and at the bottom of the valley especially near the river bed are many muskegs and marshes which are very dangerous to stock. There are also many quicksand beds along the shore, which are extremely dangerous.

The problem of water supply is an easy one. The average depth of wells is from ten to twenty feet, and the numerous sloughs and lakes make it unnecessary to dig wells for watering the stock.

Generally speaking this block is best suited for stock raising and dairying, but enough grain can be grown to supply local requirements.

The second group comprises all those townships adjoining the north bank of Battle river and northward to the north boundary of township 42, and from ranges 11 to 17 inclusive.

The surface of this area, apart from the river valley is gently rolling prairie. The river valley here is quite narrow and seems to break off abruptly into a prairie country. There is not the same gradual change from very rolling to level prairie as there is in the former area. Township 41, range 16 and township 42, range 17 are, however, cut up by large coulées.

The soil is a clay loam, very well suited for grain growing, and splendid crops were seen. The townships in ranges 11 and 12 are seemingly the most prosperous in this district. This is partly due to the fact that the Canadian Pacific railway has settlements here, on its improved farms. The greater part of the district is under cultivation, the principal crops being wheat and oats. Considerable barley is also grown for hogs, the raising of which is an important branch of farming. The growing of wheat, however, is the predominant feature. Dairying is also carried on to a limited extent.

The different municipalities have constructed excellent trunk roads from Battle river to the important towns on the railway. These roads are kept in excellent condition. The various roads in the interior of the group, although not as well kept, are still quite passable. They all lead by the most direct route possible into the trunk roads. Practically all the road allowances have been opened, and in several cases the "blind lines" have also been opened up to give better transportation facilities to the settlers.

The rural telephone is used extensively throughout the district.

Battle river, already described, flows through the southern part of this district. Across it are two steel bridges, one near Cranmer in tp. 39-12-4, and the other near Loveland in tp. 40-14-4. Fords are also found at various places.

The lakes in this district are very limited in number, the most important one being Goose lake in township 42, range 11. There are many sloughs, however, which produce excellent hay and pasturage.

Numerous coal mines are also found along Battle river. Probably the most important are in township 40, range 14. Here there is at least one in operation the year round. They supply the surrounding country with cheap fuel.

In general this group is a grain-growing district. It is well settled and on the whole quite prosperous. Stock-raising, except the raising of hogs, is not taken up, except as a secondary consideration. Wheat and oats are the important crops.

The third group comprises all those townships adjoining the Lacombe branch of the Canadian Pacific railway from ranges 14 to 17 inclusive, together with tp. 39-19-4.

The surface of this area is gently rolling prairie with scattered bluffs of poplar and with some low-lying land. Townships 37 and 38, range 14, are broken to some extent by the valley of Castor creek. Townships 38 in ranges 16 and 17 are also slightly broken up by the valley of Bigknife creek. Apart from these two valleys the country is gently rolling prairie.

Redwillow creek flows northwesterly through tp. 39-19-4, but the banks are indefinite, and as a result the surrounding country is liable to overflow during flood seasons. Excellent grazing and hay lands lie along this stream.

The soil is a heavy clay loam, and is not well suited to the growing of wheat, as the harvesting is so prolonged that frost is liable to injure the grain. Oats is the principal grain grown in this district. Barley is also grown to a considerable extent and is used as feed for hogs, the raising of which is an important industry. Dairying is carried on extensively, the products being shipped by rail to the Edmonton market. Several people in this district have been extensively engaged in horse raising, and from all accounts they appear to be making a success of it.

The roads in this district are in a fair condition and considerable grading has been done.

Lanes lake is the only body of water of any size in this district. This lake has dried up considerably since the original survey, especially at the ends. The bed consists of about two feet of black loam, and when worked it will produce an excellent crop. Some parts of it are now under cultivation.

Several small lakes and sloughs are scattered throughout this district, affording water for stock. In cases where sloughs have become dry they produce excellent hay. Water for domestic purposes is easily obtained at a depth of about thirty feet.

In general this group is a mixed farming country. It is well settled and quite prosperous.

Besides these three groups, a number of scattered townships lying to the south and east were investigated. Most of them suffered severely from the extreme heat and drought of the season and crops were very light.

During the season I retraced 204 miles of line and re-established the same number of monuments. The total number of monuments investigated by me exceeded 2,500.

I closed field operations on October 15.

APPENDIX No. 52.

ABSTRACT OF THE REPORT OF B. H. SEGRE, D.L.S.

STADIA SURVEYS IN THE VICINITY OF MOOSEJAW.

The area covered by my investigations during the past season may, for convenience of description, be divided into four groups.

The first group comprises townships 18 to 20 inclusive, between the east boundary of ranges 23, west of the Second meridian and Buffalo Pound lake.

The surface of this district consists of rolling prairie, which becomes rougher and more broken as the valley of Buffalo Pound lake is approached. The soil for the most part consists of a good loam, more or less freely intermixed with granite boulders. All those townships north of the valley of Qu'Appelle river are capable of producing excellent crops, but the district is not well settled for the reasons that the lands near the railway are held by speculators, and that the farmers near the lake, owing to the long hauls over the poor roads, do not find grain growing to be very remunerative, and hence go in for a larger amount of stock raising.

An adequate supply of good water is obtained by the farmers of this district at depths varying from six to twenty feet, which is quite an asset. With a railroad nearer Buffalo Pound lake or an improvement of the roads this district should soon become thickly populated.

There has been very little grading done in this district, especially away from the railroads. Many hillocks need cutting down and many low places need filling, and until these improvements are made, farmers who are far away from the railroad towns find their transportation problem a serious one. There are a few crossings on Qu'Appelle river which are bridged, but the grades leading to them are in many instances excessive.

Telephones are rather scarce in this district, but during the summer a few new lines were being erected which should prove of great value to the settlers.

The southern part of the district is cut up by Qu'Appelle valley, which is about a mile wide and from 250 to 300 feet deep. The northern slopes of this valley consist chiefly of prairie with a few shrubs in the coulées, but the southern slopes are covered by a growth of poplar, ash, and willow; the flats adjoining the banks of the river provide excellent pasture for stock, and in some places are being used for growing grain. The light snowfall in this locality, along with the shelter provided by the wooded slopes of the valley, make ranching attractive. The light snowfall of the previous winter and the dry summer has lowered Buffalo Pound lake about two feet, and at the same time has affected the flow of both Moosejaw creek and Qu'Appelle river. Numerous sloughs in these townships are dried up, and were this year producing hay, a fact which was greatly appreciated by the farmers, owing to the failure of the oat crop in this district.

The second group comprises townships 17 to 20 inclusive, and between the first group and the Third meridian.

The surface of this district varies from gently undulating prairie on the eastern boundary to gently rolling prairie on the western boundary, while the southern boundary is cut up by the valley of Thunder creek, which is a tributary of Moosejaw creek. The soil is a light sandy loam in the eastern portion, becoming a little heavier in townships 19 and 20, ranges 28 and 29. The soil along the slopes of Thunder creek is sandy, but gets a little heavier to the south of the valley, with the surface becoming very much broken up.

All the lands in this block are used for grain-growing purposes, except along the slopes of Thunder creek valley, where the farming operations are confined to stock raising only. A good growth of grass thrives along these slopes and the river flats, while the shrubs and poplar bluffs provide the necessary shelter from cold and wet. The water supply, however, is uncertain, as at the time of investigation the creek was dry in places, and the stock were becoming dependent on the supply from wells.

The country north of the valley produces excellent crops, but the farmers have great difficulty in procuring an adequate supply of water. A few wells 200 feet in depth have been sunk, and an abundant supply has been obtained, but the water is generally of an inferior quality. This shortage of water is keenly felt by the smaller farmers who cannot afford the expense of sinking deep wells, and consequently have to spend a great deal of their time in carrying water from the many Government ponds scattered throughout the district.

This district is well supplied with railway facilities as the main line of the Canadian Pacific runs along the southern boundary, and two branch lines of the Canadian Pacific and the Grand Trunk Pacific run northwesterly through the district. A daily passenger and freight service is maintained by the Canadian Pacific, whereas on the Grand Trunk Pacific the service is confined largely to freight, owing to the line being completed only a short time ago. This new line supplies a long felt need to many farmers who found the haul to the Canadian Pacific very long.

The roads in this district are nearly all graded, and generally are in very good condition. In places where the soil is light, however, the wind drifts it over the roads, making them very heavy for traffic, especially after rainfall.

This district is well supplied with telephone facilities, nearly every farmer having a telephone in his house, and extensions are being carried on every year.

The towns along the railroads in this district are all small, except Moosejaw, which extends into township 17, range 26. This city is a thriving divisional point, being served by three railways, with many branch lines running out of it. There are many industries in this city, the largest being the Robin Hood flour mills, which employs a large staff. The city has lately completed its new water-works system, which has proved the solution of a vexatious problem.

The supply is obtained by placing filtration galleries along Sandy creek in township 17, range 29, and then conducting the water by a pipe line a distance of twenty miles to the city.

This district is undergoing a great change in its water areas; all small sloughs are completely dry, and their beds are being used as pasture land. Pelican lake, which lies in the valley of Thunder creek, is completely dry, and now constitutes the largest dry lake bed in this district. Another lake which formerly covered about 200 acres in tp. 18-28-2 has dried up, and the bed is being used for grazing purposes. All that portion of Thunder creek lying to the north of Pelican lake is now dry, but below Pelican lake water lies in pools along the course of the creek. Sandy creek, the tributary of Thunder creek, which is the source of supply for the city of Moosejaw, has many springs along its course, and hence always contains water. There is a small lake in tp. 17-29-2 which was traversed; this lake is evidently permanent as the Canadian Pacific Railway company formerly had a water tank and pumping station on it.

The third group consists of townships 17, 18, 19 and 20, range 1, townships 19, ranges 4 and 7, and townships 20, ranges 2, 3, 4, 5 and 7, all west of the Third meridian.

The surface in this district consists of gently rolling prairie in range 1, becoming rougher as one travels west, finally becoming very rough and hilly around townships 19 and 20, range 7, where the Vermilion hills occur. The surface of the country adjoining the valley of Thunder creek is also very rough, the valley itself being about

150 feet deep in some places, with slopes nearly perpendicular, thus making good road crossing very hard to find.

The soil of this district varies from a light loam on the east side, to a good loam on the west. This loam is always found to be freely intermixed with granite boulders; these boulders became larger and more numerous immediately adjoining the valley of Thunder creek.

This district is well settled but owing to two consecutive dry seasons, there was almost a complete failure of crops this year. This seeming disadvantage can be overcome in any normal year, as the soil is very fertile and easily worked. Settlement is not very thick in tp. 20-7-3 owing to the hilly nature of the country, numerous deep ravines with precipitous sides being found. These hills would make an ideal place for ranching, if the problem of water supply could be overcome. Here, as in the district to the east, the farmers find some difficulty in obtaining a sufficient supply for all their needs from the shallow wells they are able to dig. There is no doubt however that the past season was a most severe test on wells owing to the dry weather lasting for two years. In ordinary years the settlers of this district should have no difficulty with their water supply.

The coming into this district of the branch line of the Grand Trunk Pacific railway has supplied a long felt want, effecting a great saving to the farmers who hitherto have had to haul their grain about twenty-five miles to the Outlook branch of the Canadian Pacific railway. Many little towns are springing up along this line, but as yet no industries have been undertaken in any of them.

The roads in this district are mostly graded, but in a few cases they are in poor shape; especially is this true in tp. 20-7-3, where the road allowances offer very poor routes for travelling. The old trails are being fenced as quickly as the district becomes settled, causing a great deal of inconvenience to those farmers who have been in the habit of using them. A good crossing of the valley of Thunder creek is badly needed for those people who live on the south side of the valley in township 19, range 4, and west of it.

Telephone communication is very poor in this district due no doubt to the fact that it has been lately settled; however, the nearer the farmers are to the railroads, the better the telephone facilities.

All small sloughs in this district are now dry and produce hay, especially in the case of tp. 20-7-3. This township contains a large number of sloughs, which are now completely dry. This fact has been made good use of by the settlers, who have put up an abundant supply of hay, thus partially offsetting the failure of their oat crop, and rendering the problem of feed for their stock a little easier. The valley of Thunder creek runs through this district; the creek itself was dry, and many lakes lying in the valley have dried up. The largest noted being a lake in tp. 19-4-3.

The fourth group comprises a block of townships lying immediately north of the third group.

The surface in this district is cut up on the west by the valley of South Saskatchewan river; the valley at this point is about 300 feet deep, and over a mile wide. Above the valley the surface varies from gently undulating prairie to gently rolling prairie, until range 3 is reached, after which the country becomes rougher especially to the north, until the sand-hills which adjoin the valley of Qu'Appelle river are reached. Here the surface becomes very rough and cut up by many deep ravines.

The soil on the slopes of South Saskatchewan river becomes lighter as one approaches the shores, and in tp. 22-7-3 there are a number of bare sand-hill with no trace of vegetation growing on them. Above the valley, the soil consists of a good loam which produces excellent crops in ordinary years, but the effects of two abnormally dry years were felt in the shrinkage of the crop yield.

Along the banks of the South Saskatchewan there is a good growth of poplar and willow, and in secs. 29 and 32, tp. 22-7-3 the poplar reaches nearly thirty-six inches in circumference, however, these large trees are being cut for fuel, and will disappear in time. Above the valley the surface consists of prairie until the valley of Qu'Appelle river is reached where poplar and willow are again found. The sand-hills north of the Qu'Appelle have been placed in the Elbow Forest reserve and are covered by a dense growth of willow and poplar.

This district is very thickly settled from the eastern to the western boundaries, and as one approaches the Outlook branch of the Canadian Pacific railway the improvement in the buildings of the farmers is very noticeable and indicates the prosperity of previous years. All the lands are used for grain growing, and have produced good crops until this year, when the yield has fallen.

The railroad facilities of this district are very good, two branch lines of the Canadian Pacific and Grand Trunk Pacific railways serving the territory. To the north along the valley of the Qu'Appelle there is a location line of the Canadian Northern railway; this line when constructed will be of great benefit to the settlers on the north side of the valley, by saving them the extra haul across the valley to the Canadian Pacific.

The roads in this district are for the most part graded, and a little improvement is being undertaken every year tending to produce good roads a few years hence. There is a fair trail down a ravine in tp. 22-7-3 leading to a ferry across the river: this trail can be greatly improved by the building of a grade and proper draining of the road bed. The grade across the Qu'Appelle valley in tp. 23-2-3 was travelled over after a heavy rain, and was found to be in very poor condition: this could be easily remedied by the use of some gravel an abundant supply of which can be obtained along the slopes of the valley.

Telephone facilities are on the whole very good in this district and additions are being made every season tending to the betterment of the service.

The drying up of sloughs is very evident in this district; all small sloughs were found to be completely dry, and were being used for hay purposes. One lake of fair size was traversed in tp. 22-3-3; this lake at the time of traversing had its bed covered by a coat of white alkaline mud too soft to bear the weight of a man; however, after a rainy period the whole bed became covered by water. There is no vegetation on the bed of this lake, and the land is quite useless for farming purposes.

The lake in tp. 22-7-3 was found to be dry at the time of investigation; the bed of this lake was covered by a thick growth of marsh grass around the shores and by a thick growth of reeds in the centre; there is no doubt that the reedy portion of the bed will be covered by water in wet years, as it is the natural basin for receiving the drainage of a large area.

Ridge creek, which is a tributary of the Qu'Appelle, drains a large area in this district; no water was found along its course until the valley of the Qu'Appelle was approached. Qu'Appelle river was found to contain water, but was very much lower than usual.

After completing the investigation of this district, I left on October 12 to investigate tp. 28-1-3, for which I had special instructions. Silver lake in this township was found to be dry, and in spite of recent heavy rains the former bed was able to bear the weight of a man; hence it is very likely that it will remain permanently dry.

I closed operations in the field on October 15.

APPENDIX No. 53.

ABSTRACT OF THE REPORT OF F. V. SEIBERT, D.L.S.

SURVEY OF THE 26TH BASE LINE BETWEEN THE FOURTH AND FIFTH MERIDIANS.

When making plans for the survey of the 26th base line, I decided to commence at its intersection with the Fourth meridian. The route which I proposed to follow to reach this point was by scows down Athabaska river to the vicinity of the base line and from there overland to our destination. Accordingly, on May 1 I left Athabaska with my party and outfit on four scows, arriving at McMurray on the 13th. At this point we were met by the pack ponies which had been sent down the river on the ice. The ponies were loaded on the scows and after experiencing considerable difficulty at the various rapids on account of low water, we reached the mouth of Redclay creek in the vicinity of the line on May 16.

A cache was built on the west bank of the river at this point. In it were placed the supplies for use on the line west of the river, while the supplies for use east of the river were cached on an old dead channel of Firebag river. The supplies for the western end of the line had been cached in March at the intersection of the 25th base line with the Fifth meridian.

On May 20 we commenced cutting trail to the Fourth meridian. This trail was kept as close as possible to the latitude of the line, so that it could be used when making the survey. The Fourth meridian was reached on June 4, and the production of the line was begun the following day.

East of the Athabaska we encountered no unusual difficulties in running the line. As the trail had already been cut the whole party worked on the production of the line, and good progress was made, the river being reached on June 9. Feed for the horses was somewhat scarce on this part of the line, but sufficient was secured.

West of the Athabaska our transportation difficulties began. Ninety-six miles of line lay west of the river, and our next cache was situated twenty-four miles south of the end of the line. We were therefore 120 miles from our next source of supply. This part of the line crossed many large swamps and muskegs, and to add to our difficulties a number of horses had died of swamp fever when working east of the river, while a number of others were suffering from this disease at the time when the transport was heaviest. The most swampy part of the line was from Athabaska river, in range 9, to the foot of Birch mountains, in range 11. The best horse feed found was on the eastern slope of these mountains. From there on the grass was scarce, and the horses suffered accordingly, but we found many good stretches of trail from range 12 to range 16, and were able to make good progress. We found some good horse feed along Birch and Louise rivers in ranges 19 and 20, and were able to rest the horses while we rafted our supplies on Birch river from the middle of range 19 to the middle of range 21.

Snow fell on September 14 and for nine days following was continually on the ground. This left the horse feed in poor condition, and we were forced to do some man-packing in the last few ranges.

We reached the Fifth meridian on October 7. I then took four men south to the cache on the 25th base line and man-packed enough supplies north to enable us to cut a trail and get our camp moved to the cache. We left the cache on October 17, and followed the old trail from Burnt lakes to Chipewyan lake and across the portage to

Wabiskaw river. From there we followed the trail along the east side of Wabiskaw river and lake to Wabiskaw settlement, and thence to Sawridge, where we arrived on November 11.

The country east of Athabaska river for twelve miles on either side of the base line is of little agricultural value, being mostly sand ridges and muskeg. This area is best suited for a forest reserve. There is very little timber of commercial value on it now, but this is because of forest fires.

The valley of the Athabaska which crosses the base line in range 9 averages a mile in width, and the river one-half mile. The depth of the river varies with the season, but is always sufficient for good steamboat navigation. Some good spruce grows along the banks, and the river flats are the best of land. Firebag river enters the Athabaska about a mile below the line. The north branch of this river crossed the line four times. It is navigable for canoes throughout almost its whole length.

From Athabaska river to the foot of Birch mountains, the soil, though wet, would make good farm land. It is composed largely of clay deposits from the hills to the west. It could be easily drained, and the water on it now is principally the result of beaver dams. There is some good poplar, spruce and jack pine in this area. The east slope of Birch mountains in ranges 11 and 12 has good soil, but is very steep in places. The timber here is good, there being much large spruce and poplar, also much white birch from which the hills no doubt derive their name. These mountains appear to be mostly glacial deposits. A few small limestone and sandstone ledges were noted on the eastern slope, but most of the cuts, and there are many, show boulder clay. From the summit in range 12 to the fifth meridian the country is almost entirely covered with moss. Underlying the moss in ranges 13, 14, 15 and 16 is a mass of boulders imbedded in clay. In that district are many lakes and shallow muskegs. In range 14 there are some large lakes which are drained by Marguerite river; this river is very probably the headwaters of Moose river. From range 15 west the high land has fewer boulders and more clay, but most of the muskegs are deeper and they are more numerous. The headwaters of Louise river start in the west side of range 14, and the line follows the drainage of this river and Birch river very closely to range 21 where Birch river swings to the northwest. In range 18 Louise river joins Birch river, which comes from the south beyond the correction line. These rivers have large areas of muskeg on either side, but back from the river at distances of from three to eight miles are hills of clay land with some boulders. These hills all have a growth of poplar, spruce and some jack pine, but here again the fires have kept the timber growth small. In range 23, the height of land between Athabaska and Peace rivers is crossed. From there the country slopes westerly along Mikkwa river valley.

Moose and caribou were very scarce all along the line, but fur-bearing animals were plentiful. The most common were beaver, fox, mink, marten, black bears, timber wolves and muskrats. Birch river was very noticeable for its many mink.

Aside from the tar sands on Athabaska and Firebag rivers no minerals were noted.

Whitefish were seen in Athabaska river and jackfish in all the large lakes and streams.

Photo by A. M. Narraway, D.L.S.

DRYING WHITEFISH NET, LITTLE GEORGE ISLAND—LAKE WINNIPEG.

By law all nets must be taken from the water over Sunday. They are brought to the fishing station in wooden trays, one of which is shewn in the lower left corner, and wound slowly on reels to disentangle the floats and leads. Each fisherman has a reel, and the inspector of fisheries can tell at a glance if the law is being observed.

Photo by R. B. McKay, D.L.S.

GARDEN OF EXPERIMENTAL FARM—FORT VERMILION.

The grain and vegetables grown and ripened on this farm indicate the agricultural possibilities of the vast stretch of level country lying north and west of Fort Vermilion. The area of good agricultural land in this vicinity is estimated at over 3,000 square miles.

APPENDIX No. 54.

ABSTRACT OF THE REPORT OF H. M. R. SOARS, D.L.S.

STADIA SURVEYS IN NORTHERN ALBERTA.

My stadia surveys of the past season were begun in tp. 52-23-4, and from there I worked easterly through ranges 22 and 21.

Owing to the proximity of the city of Edmonton many of the homesteads in these townships are held by speculators, and are still in an uncultivated state. The surface, generally, is rolling, and in many places poplar and willow grow in clumps. The land is not cultivated to any great extent except in tp. 52-23-4, but dairying is carried on and a great deal of milk is shipped to Edmonton daily.

After finishing this work we moved by scow across Cooking lake to the southern part of tp. 51-21-4, where we struck the road from Edmonton to Tofield. The old trail has been abandoned, but the road allowances are so improved that there is now an excellent motor road to Tofield.

The water of Cooking lake is not good. It appears to come from springs in the centre and from the creek connecting it with Halfmoon lake. The depth averages from seven to eighteen feet, the deepest part being in the narrows, in section 35, tp. 51-21-4 and the shallowest in the bays. Very few of the settlers around this lake do much farming; they grow only sufficient grain and vegetables to meet their own wants. The locality seems especially adapted for the raising of potatoes, those obtained being of exceptionally fine quality. On the whole the district is admirably suited for mixed farming, the grazing being luxuriant, water plentiful and the market close and easy of access.

From township 51, range 21, work was carried on in an easterly direction through townships 51, ranges 20, 19 and 18, camp being moved along the Tofield trail. That portion of tp. 51-20-4 lying south of Hastings lake is very hilly, the main trail along the south cross line presenting a series of abrupt hills, but the road improvement has been so well carried out that the trail is quite suitable for the hauling of heavy loads. This township, though well adapted for mixed farming, has not been cultivated to any extent. Some very fine potato crops were noticed on the side-hills.

On reaching the vicinity of Beaverhill lake some very fine farms were seen. A very large amount of hay is annually cut along the west side of the lake. The stock in this vicinity was in splendid condition and the crops were heavy. There is a soft lignite mine in operation just south of Tofield.

To the west of the lake lie the Beaver hills, rising to a height of probably 250 or 300 feet. Cooking Lake Forest reserve covers about three townships in these hills. Unfortunately they have been burnt over on several occasions and a large amount of good timber has been destroyed.

That portion of tp. 52-19-4 lying east of the reserve, and all of tp. 53-19-4 were investigated. No great amount of cultivation has been carried out through these townships, the surface of the former being very broken and covered with dense brulé in many places, but both townships have been patented practically throughout.

In tps. 53 and 54-18-4 the country becomes more level and is fairly well cultivated.

The little market town of Chipman on the Canadian Northern railway in sec. 30, tp. 54-18-4 is the centre of a rich farming district and prosperity, the result of good crops and energetic farming, is most noticeable. Several carloads of stock, including sheep, cattle and hogs are shipped weekly into Edmonton.

The country on the east side of Beaverhills lake is wooded with scattered bluffs of small poplar and willow. A good percentage is under cultivation. Mundare on the Canadian Northern railway, the market town for this district, shares in the prosperity so marked through this locality.

Beaverhills lake, which is superficially one of the largest water areas in this part of Alberta, would appear to be an overflow from the creeks that run in from the west and south and not a natural lake bed. It is very shallow, many sand-bars appearing in the centre. The average depth for a distance of ten chains or more from the shore appears to be from three to five and one-half feet. Seven feet was the deepest sounding taken. The lake is weedy. It would appear that the flooding of the surrounding meadows, which sometimes occurs, is caused more by a strong wind prevailing from the same quarter for some length of time than by excessive rainfall. The fact that this flooding occurs more in the south and southeastern parts of the lake would bear this out, as the prevailing wind in northern Alberta is from the northwest.

To summarize on the district investigated it may be stated that, with the exception of some rough land adjacent to Cooking Lake Forest reserve, the country is well adapted to any form of farming, though mixed farming would appear to be the most suitable. Truck farming in the Edmonton neighbourhood should prove a very paying venture, as early frosts do not seem to be prevalent through this district.

The country north of township 35 up to Lac la Biche and west from range 7 to the Fifth meridian appears to have had a heavy rainfall this year, but not sufficient to damage the crops. This block of land comprises the very choicest farming country in Alberta. The climate is equable and the water plentiful and good. There is sufficient timber for local use and sufficient bluffs for cattle wind-breaks. An abundance of upland and slough grass can be cut, and in many places the pea-vine is most luxuriant. East and south of this district the greater portion of the country suffered this year from drought.

On October 6 I left my assistant to complete the work in this district and to move the outfit to Edmonton, while I, accompanied by one man, left for tp. 60-12-4 to resurvey a portion of Garner lake. The trail taken lay through a district in which the majority of settlers are Russians, who appear to be very prosperous. The old Victoria trail has been abandoned and the road allowances are travelled. The country is uniformly good through Andrew in tp. 56-16-4 and on to Saddle Lake Indian reserve. On the north side of the Saskatchewan is a stretch of exceptionally fine country, but the Indian reserve covers about 140 square miles of the choicest. The townships to the north and east of Saddle lake have been well settled during the past five or six years by a very good class of settlers, principally English, French, American and Canadian.

This fertile district is only awaiting the railway facilities to be opened up by the completion of the Canadian Northern railway from North Battleford to Edmonton to become one of the most prosperous and desirable localities in Alberta. The surface is generally rolling, and is well timbered, but it can be easily cleared, where necessary. Upland grass, pea-vine and slough grass is plentiful throughout. Water is abundant and good, and many of the lakes contain whitefish, pike, pickerel and perch. It is essentially a mixed farming country.

Between these townships and Downing on the Edmonton-Victoria trail, there is a stretch of about eight miles of rather rough country covered with dense poplar. A few Russians, some of whom seem to have a preference for thickly wooded homesteads, have settled there, and are gradually developing the country.

Around Wahstao, in ranges 15 and 16 is a thriving colony of Bukowinians, who located there in 1902 and 1903. They are now in a very prosperous condition, and it is evident that Bukowina furnishes some of the most desirable mid-eastern European immigrants.

From Victoria on to Edmonton the trail runs through a uniformly good mixed-farming country.

Edmonton was reached on October 15 and the party paid off.

The work throughout the season was delayed both by the many heavy rain storms and by the thick bush which surrounded the lakes.

APPENDIX No. 55.

ABSTRACT OF THE REPORT OF N. C. STEWART, D.L.S.

SURVEYS IN THE REVELSTOKE DISTRICT, BRITISH COLUMBIA.

My work for the past season consisted of the survey of lands along Columbia river, south of Golden.

I began in tp. 27-22-5 where I traversed parts of Columbia and Kicking Horse rivers together with the islands. Most of these islands are likely to be flooded at high water and are therefore of doubtful value.

On May 8, I moved by canoe up Columbia river to tp. 26-21-5. Sufficient lines were run to survey a bench of land which lies in sections 31, 32 and 29. This bench is from 300 to 500 feet above the Columbia and about a half mile in width.

From the same camp surveys were made on the west side of the river in secs. 25 and 36, tp. 26-22-5. This is a low wet area composed of marshes, sloughs, mud flats, and hay meadows.

On May 30 I moved to sec. 23, tp. 25-21-5. The bench land southwest of the river in the vicinity of this camp is narrower and more broken up by creeks, but it is a continuation of the bench land in the townships to the north. Nearly a week was spent in traversing Columbia river near this camp.

My next camp was at Carbonate Landing in sec. 8, tp. 25-20-5. The land on the benches southwest of Columbia river in this township is better than that to the northwest and the benches are larger and more numerous. Some good timber consisting of fir, spruce, jackpine and cedar, averaging about eight to ten thousand feet B.M. to the acre was found in the west half of section 5.

A pack-trail to Spillimacheen river starts at Carbonate landing. It was made many years ago during a mining boom up the Spillimacheen and now needs clearing out as it has been kept open by hunters and trappers only.

Surveys were also made on the bench land northeast of Columbia river in tp. 25-20-5. A good road giving access to this land has been built during the past two years. It joins the main road near Mallet station on the Kootenay Central railroad. Practically all quarter-sections on this bench land have been filed on. The cultivated areas at present are not very extensive, but good crops of vegetables, small fruits, and clover have been raised.

On July 25 I moved to Ore Pile landing in sec. 17, tp. 24-19-5. Specimens of the galena ore which were taken from the Spillimacheen over an old sleigh road are still to be found there, although the road itself is hardly traceable. From this camp surveys were made on the bench land west of the Columbia in townships 24, ranges 19 and 20. The bench land widens out in these townships, and there is a low divide between Columbia and Spillimacheen rivers. The soil is about the same as in the townships to the north. Nearly all the large timber has been burnt off and a dense second growth has grown up. The few creeks in the neighbourhood are small and some of them dry up in the summer. The bench land ends near the S. by. sec. 36, tp. 23-19-5, and from there to the south boundary of the railway belt the steep slopes of Jubilee mountain reach almost to the banks of Columbia river. Before leaving these townships we made a complete stadia traverse of the river and of the marshy lakes which appeared to be permanent.

In tp. 23-18-5 I surveyed the N. and E. bys. of sec. 32 and sufficient lines to complete the survey of the low valley lands on the southwest side of the Columbia river. I also made a stadia traverse of the river and the marshy lakes.

From October 14 to October 30 I completed the traverse of Columbia river from the S. by. tp. 25-20-5 to the town of Golden. All the marshy lakes in this area were also traversed.

Every quarter-section of any value for agricultural purposes along the northeast side of the Columbia between Golden and the south limit of the railway belt has been filed upon. The settlers as a rule have come into the valley without means and consequently the amount of land cleared is small. Very few settlers have located on the southwest side of the river, owing chiefly to the difficulties of transportation across the river.

During the summer a party of engineers were engaged making a survey of the lowlands along the river between Golden and the belt limit. This I believe is the preliminary work of a company which has been formed to drain this area. Should this company be successful in their undertaking 16,000 acres of the finest land in the province will be open for settlement.

Game is very plentiful in the valley. In the fall ducks and geese are found in the sloughs in large numbers. Mountain goats can be seen on the Beaverfoot mountains any clear day and the Spillimacheen valley is famous for grizzly bears

APPENDIX No. 56.

ABSTRACT OF THE REPORT OF P. B. STREET, D.L.S.

SUBDIVISION SURVEYS IN NORTHERN MANITOBA.

I left Pas, where my party was organized, on September 28 and travelled by way of the Hudson Bay railway to tp. 69-7-Pr., where I arrived the following day.

Our work for the winter consisted of the subdivision of part of this township and other townships adjoining it to the northeast, along the railway right of way.

Our main supply camps were located close to the railway while the work was carried on from flying camps which were kept close to the lines being run. On some parts of the work the country was so strewn with windfall that we could not clear trails for the dog teams without wasting too much time, so we man-packed the supplies from the main camp. During the month of December two packers were kept busy every day, to keep the camp supplied.

In the first week of November we had a fall of fifteen inches of snow, and the weather turned cold; the muskegs, however, remained open till January. By that time the snow was two feet deep and travelling across country was very slow, especially where there was much windfall. All the creeks had frozen to the bottom and it was necessary to melt snow for our water supply. For this purpose it was necessary to keep one man in camp all the time. During the last week of January we had the only extremely cold snap of the winter; the thermometer registered from —40° to —50° on several occasions.

I closed operations on March 17, and returned by train to Pas.

The country covered by our surveys is mostly rolling, and is well drained by numerous small creeks. The surface is practically all densely wooded with poplar, spruce, jackpine, birch and tamarack. The timber, however, is not large enough to be of commercial value.

The southern part of this district borders on Sipiwesk lake. The country around the lake is rolling and somewhat rocky. This lake seems to have innumerable narrow bays which run inland for several miles. Its shape is the most irregular of any body of water I have ever seen, and a stranger attempting to cross it in summer might easily become lost for a week before he could locate the main outlet.. It appears to be shallow and in winter a great deal of fishing for sturgeon is done on it.

Moose seemed to be plentiful north of this lake and numerous foxes and timber wolves were seen.

APPENDIX No. 57.

ABSTRACT OF THE REPORT OF A. G. STUART, D.L.S.

BASE LINE RETRACEMENT AND MISCELLANEOUS RESURVEYS IN MANITOBA AND SASKATCHEWAN.

The first work undertaken was the retracement for bearings of some townships bordering on lake Manitoba, part on the north shore west of Gypsumville, and part on the west shore near Ebb and Flow lake. This was completed early in May. During this retracement we re-ran about 400 miles of line.

While carrying on the above work the snow was very deep, having drifted in among the scrub and timber to a great depth. During the warm spring days it melted so rapidly that a pair of snowshoes in the west lasted only a few days. At night a thin crust formed, which made it very inconvenient to move rapidly and during the latter part of the work we were continually wading in a foot or two of ice water as the lands immediately surrounding the lake are somewhat low and swampy.

No doubt at some future date lake Manitoba will be lowered by the dredging of the river channel linking the two lakes. This will drain large tracts of land bordering the lake, making it more fitted for agricultural pursuits.

It is also probable that at some future date the rivers joining these two immense inland seas will be made navigable and thus the future settlers of lake Manitoba will have a waterway to Winnipeg, the metropolis of the West. These lands would then be almost ideal for homesteads as the soil is rich and there is an abundance of wild hay, building material, wood, game, and whitefish.

Upon the completion of this retracement I organized a larger party to retrace the 2nd base line between the Second and Fourth meridians, and also the Fourth meridian from the international boundary northerly over sixty-one townships. These surveys were necessary in order to check the accuracy of the original work

Lines of levels and check levels were carried over the outlines retraced, elevations being established in the towns in the vicinity of the work, and connections made with several other lines of levels, including railway, irrigation, and precise levels of previous surveys. These levels were reduced to mean sea-level datum and added to the network of levels already taken over the western provinces, which will some day be of immense value in the development of the country.

There is little doubt that in future years these provinces will need and be supplied with hydro-electric power on an even greater scale than it is being developed at present in the province of Ontario; at such a time the levels will be very useful. Large sums of money are being spent yearly on graded roads and with the ever-increasing usefulness and popularity of power vehicles has come a demand for national highways such as is at present being felt in the Western States, and the system of levels taken in connection with Dominion lands will again prove its usefulness, while in many places in the northern part of the provinces drainage problems on a large scale will be made easier.

Sixty-nine miles of the base lines closing on the meridian were retraced for bearing.

In the Wood mountains and Cypress hills, which were crossed by our surveys, there is an abundance of wooded country supplying the settlers in the surrounding prairie with building material and fuel. In the latter place there is a national

forest reserve where restrictions are enforced for the preservation of growing timber. Homesteaders come to this place during the winter months for a distance of sixty miles in order to obtain fire-wood.

In southern Saskatchewan soft coal was obtained from local mines in many instances. In this district ranching on large tracts of leased land is carried on extensively. The country appears to be much more suitable for this purpose than for farming on a small scale.

During the season, besides the retracement around lake Manitoba, 750 miles of outline were retraced, 60 magnetic observations were made and about 325 azimuth observations were taken and computed.

APPENDIX No. 58.

ABSTRACT OF THE REPORT OF C. H. TAGGART, D.L.S.

SURVEYS IN KAMLOOPS DISTRICT, BRITISH COLUMBIA.

The principal work on which I was engaged during the season was the delimitation of the north boundary of the railway belt westerly from North Thompson river. A few other small surveys were also made before this work was commenced.

In tp. 22-16-6 we traversed a portion of Heffley creek. To reach this work we travelled north along North Thompson river, then east along Heffley creek. The city of Kamloops has a transmission line along the river to their power-house on Barrier creek, about forty miles north. The available head of water there is about one hundred and eighty feet and the available horse-power is said to be 20,000.

The transmission line crosses large areas of valuable land which need only irrigation to make them productive. It is now possible that nearly all of this land can be brought under cultivation by using this electrical power to pump water from the river, provided that the rates are not prohibitive.

Having finished the work in township 22, range 16, on April 24, we moved back to Kamloops, and then following the wagon road easterly along the north side of South Thompson river, we reached tp. 20-14-6, where we were engaged until April 28 running section lines.

In this township, on the bench lands above South Thompson river, many settlers have located, and are trying to raise crops with the dry farming method, but with what success it is rather difficult to say, as only a small area has as yet been cultivated.

On April 29, we again moved to Kamloops, and on the following day left for tp. 23-17-6, by way of the wagon road along the west side of North Thompson river.

The first thing of note after crossing Thompson river west of Kamloops, and passing through North Kamloops, is the new townsite recently laid out along the Canadian Northern railway. Just to the east of this townsite the railway crosses the North Thompson on a fine steel bridge of the lift-span type, which I understood is the first of its kind in Canada. Station grounds have been laid out just west of and adjacent to the wagon road. It is in this vicinity that it is expected the new railway shops are to be erected.

All the bottom lands along the west side of North Thompson river, with the exception of a few holdings, belong to the British Columbia Fruitlands company, who also have extensive holdings along Thompson river between the North Thompson and the Kamloops lake. A fine up-to-date irrigation system has been constructed to carry water for the irrigation of these lands. The water is taken out of Jamieson creek about three hundred yards west of the wagon road crossing, and conveyed to the lands by concrete-lined canals and underground concrete pipes. The main canal is fifteen or sixteen miles long and follows close to the foot of the hills. Where the main canal passes a large rock slide, an inverted syphon has been constructed, which is at least half a mile in length. The intake and outlet bases are built of reinforced concrete, and the syphon consists of a forty-eight inch continuous wood stave pipe laid underground. A very large amount of money has been spent by this company to construct their irrigation system. The chief crops grown on the lands above mentioned are hay, and some fruit.

The limit of the railway belt after crossing the North Thompson passes over the Jamieson range of hills, which are about 2,500 feet above the river. The fact that our

camp had to be located along the river, and, that after the first couple of days this climb had to be made before a day's work was begun, made progress slow.

The line was produced westerly until well down the west slope of the range, so as to be easily picked up after establishing a new camp on Jamieson creek.

We decided that it would be very difficult to construct a trail over the Jamieson range, and that it would be simpler and much quicker to go around and use the old trail up Jamieson creek. We therefore moved our outfit to the head of the British Columbia Fruitlands company's irrigation ditch, where we made our cache, and started to rush supplies up to the line, as it was feared that the creek was liable to be soon in flood, which would make transportation difficult. Unfortunately the weather turned very warm and, augmented by two days' heavy rain in the mountains, the freshet water started down from the hills, and before we could make the trail passable for pack trains, Jamieson creek had become a roaring torrent, washing out bridges, and making fords practically impassable.

Jamieson creek flows in a narrow valley and to get up at all with a pack train the stream has to be crossed many times, and in all but one place bridges had to be built. Considerable time was lost from the actual line work by these operations. It was found necessary to pack hay and oats for the horses as the vegetation on the hills was of no value for horse feed.

From the crossing of the north fork of Jamieson creek to the high land in sec. 28, tp. 23-18-6, the belt limit passes over rough broken country mostly wooded with a dense growth of small fir, with much standing and fallen dead timber. Wentworth lake in section 28 has been converted into a storage reservoir for irrigation waters for the lands belonging to the British Columbia Fruitlands company. Alexander lake, about three miles due west from Wentworth lake, is also a reservoir, in which the west fork of Jamieson creek rises.

While working in the neighbourhood of Wentworth lake the weather was very bad, with snow, sleet and cold rains. On June 6, 7 and 21 heavy snowstorms were experienced; in fact while working in this vicinity three to four feet of snow was still on the ground.

We carried the line westward to the NE. corner of sec. 14, tp. 24-20-6, where we connected with that part of the "belt limit" previously run. My next work consisted of the subdivision of all the unsurveyed lands in the vicinity of Criss creek, in township 24, ranges 20 and 21, and a few miles in township 23, range 21.

Criss creek with its many tributaries drains a large area of country. The main creek appears to rise in Tsintsunko and Caribou lakes which are in provincial lands just north of tp. 23-18-6. These lakes could be well utilized as storage reservoirs for irrigation waters. During the spring freshet Criss creek is a large roaring stream, but as soon as the run off is over the stream becomes practically dry in an average season. A water power development of some size might be possible of the Tsintsunko lakes. Between the large lake to the south of the group and the northerly one there is a fall of from ninety to one hundred feet.

The subdivision in this district was completed on August 30, and I then started the production of the northerly limit of the railway belt westerly from the north boundary of sec. 8, tp. 24-21-6.

Deadman river flows in a narrow valley bounded by steep rugged hills with many narrow canyons. The belt limit crosses the north end of Mowich lake which is an expansion of Deadman river. To the northward about a mile is Deadman lake, which is now used as a storage reservoir for irrigation waters, a splendid dam having been built at the south end of the lake. The waters are used on lands belonging to a company operating very extensively at Walhachin.

A little difficulty was experienced in getting a pack-trail up the west side of Deadman valley, but we were fortunate to find a passable route, and finally located

a camp above the river. Between this point and Hihium lake a rolling plateau is crossed, which like most plateaus in this district is about 4,000 feet above sea-level, and well wooded with pine and small fir. Occasional wild hay meadows were seen, but their size is too small to be of any great value.

Cattle and horses in large numbers were seen ranging over this country and for this purpose the country is well adapted. It seems to be best suited for sheep ranging.

Hihium lake in tp. 24-23-6 is a large body of water; its altitude is from 4,500 to 5,000 feet, and its waters abound with fine trout. Ducks and geese were seen there in large numbers, also deer and bears. The outlet of this lake is a creek by the same name, which flows westerly into Loon creek, a tributary of Bonaparte river.

From Cultus Lake post office on Deadman river a pack-trail leads over the hills, and at the summit branches, one branch going north to the north end of Loon lake, which is in provincial lands, and where a small settlement is to be found; the other branch goes westerly to Hihium lake.

From Hihium the belt limit gradually descends to Bonaparte river valley. The country is rough and rugged and well timbered with jackpine, bullpine and fir.

After making ties to the monuments previously established, where the line crosses the Bonaparte, it was produced westerly and tied to the monument establishing the railway belt limit on the Cariboo road, in tp. 23-26-6. Subdivision and retracement surveys were then made in the vicinity of Maiden creek and Bonaparte river, the work being completed on October 26.

Along the old historic Yale and Cariboo wagon road, on which our last camp was located, but very little life was noticed, compared with former days. Only occasional freight teams or automobiles were to be seen. With the opening of the Grand Trunk Pacific railway, freight is now brought into Fort George to supply all the upper country. With the addition of the Pacific and Great Eastern railway, which is being rushed to completion, Fort George and Vancouver will be joined, and this upper country will be well served with railroads which will add much to the development of this vast area.

Large droves of fine beef cattle were seen coming down the Cariboo road which would indicate that the upper country is an excellent cattle country.

I took the party back to Kamloops, paid off the men, and with my assistants went a few miles south of Kamloops to section 4, township 20, range 18 to investigate and make retracement surveys along the Kamloops and Savona wagon road across the Nighthawk mineral claim. This work was completed on October 31.

My last work was a stadia survey of the improvements to be found on the south-east quarter of sec. 12, tp. 18-12-6 which was completed on December 23. The weather conditions throughout the district were fine, but from the farmer's standpoint it was considered very dry. On lands where irrigation was used the crops were very good, but where the dry farming methods were practised, crops suffered from lack of moisture.

APPENDIX No. 59.

ABSTRACT OF THE REPORT OF C. M. WALKER, D.L.S.

SURVEYS IN THE ROCKY MOUNTAINS PARK, ALBERTA.

My first work consisted of a resurvey of those portions of blocks 1 and 2, Banff townsite, which border on Banff avenue. When the correct positions of the lot corners had been determined, holes were drilled through the concrete sidewalk and posts were placed at one foot offset to mark these corners. Cement was tamped around the posts, while they were held in true position, thus ensuring accurate and permanent monuments.

I next proceeded to outfit a party for the resurvey of the townsite of Canmore. Considerable difficulty was experienced in locating any suitable monument as a starting point, though eventually two original iron block corners were discovered at a distance of half a mile from the town. The survey of the townsite was accordingly carried out with these corners as reference posts.

On completion of this resurvey, we continued the traverse with levels of the Calgary-Banff auto road, from the point at which it was stopped in 1913 eastward to the boundary of the park, a distance of about twenty-two miles.

We next moved to Banff and made traverses, with levels, along part of the left bank of Bow river, and of two islands in the river. We then made the necessary surveys to determine contours over the westerly slopes of Tunnel mountain with a view to further extension of the townsite of Banff in that direction.

Our chief work during the season consisted of the survey of an addition to the villa lot section of Banff, including preliminary traverses with levels along the proposed roads and final posting of all lot and block corners by right-angled offsets from the preliminary traverse lines. We also ran preliminary surveys for a road around the eastern side of Tunnel mountain, connecting with Tunnel mountain road as outlined by Mr. Mawson, and also for a branch road connecting with the Calgary-Banff auto road at Anthracite and running direct to lake Minnewanka, a distance of about four miles.

This work in the villa lot section, together with the survey of an additional subdivision in the north end of the townsite, was continued uninterruptedly until September 23, when we moved to Bankhead in order to lay out a cemetery at that place, on a tract of land chosen for the purpose by the Parks Branch.

Upon completion of this work we again moved to Banff and finished the survey of villa lots as far as we had instructions, whereupon the party was disbanded on October 21.

APPENDIX No. 60.

REPORT OF J. N. WALLACE, D.L.S.

LEVELLING IN MANITOBA, SASKATCHEWAN AND ALBERTA.

I have the honour to submit the following report on levelling operations carried out during the year ended March 31, 1915.

The work may be classified into: (1) Levels taken along meridians and base lines during their survey; (2) lines of precise levels which are run, for the most part, along railway lines, and (3) work done in the office at Calgary.

A general report on all levelling operations from their inauguration in the year 1908 to the end of October, 1914, has been prepared during this past season, and is now being printed. It gives an historical and descriptive account of the work, and contains a summary of the results, this summary including the elevations of some 8,900 points spread over the country from southeastern Manitoba to the northwest of Peace River block.

Steady progress has been made in running lines of levels. The mileage run during the past twelve months is as follows:—

	Miles.
Meridian and base line levels. New lines	2,309
Precise levels. New lines	505
Precise levels. Revised in the field	274
Total for the season	3,088

The following table shows the mileage of all levels run in each season from their inauguration to the end of this past season, each season being considered as extending to March 31 of the following year:—

Season.	Meridian and base line levels.	Precise levels.	Other levels.
	Miles.	Miles.	Miles.
1905	114		
1908	116		
1909	613		
1910	757		
1911	1,326		116
1912	1,433	497	70
1913	1,992	567	72
1914	2,309	505	
Totals	8,660	1,569	258

Total of all lines of levels, 10,487 miles.

The mileage stated for precise levels in season 1914 does not include 274 miles revised in the field.

Meridian and Base Line Levels.

These levels are run along meridians and base lines during their original survey. As the lines are surveyed in advance of settlement the levels afford the first information of elevations of the various features of the country. They are carried out with a considerable degree of accuracy, the instructions requiring each mile to be checked within the limit of one-tenth of a foot per mile between the two separate levellings in opposite directions. The instrument used is a fourteen-inch dumpy level, with inverting telescope.

The information recorded includes the elevation of the ground at every quarter mile, and in addition the elevation of the water in all streams, lakes and swamps crossed by the lines. Bench-marks for future reference are established at distances not greater than a mile apart. The mark most commonly used is a spike left in a tree, but marks are left on rocks or firm boulders if such are available. All elevations are referred to mean sea-level.

As already stated, 2,309 miles of levels of this class were run during the past year. It is convenient to deal with these from east to west and from south to north, grouping them in order of the meridians, commencing with the Principal meridian.

In the southern part of Manitoba ninety-eight miles of outline were run near the east shore of lake Winnipeg. The 13th and 14th base lines, which had been run easterly from the Second meridian, were completed to the west shore of that lake, thirty-six miles of these two base lines being run during the past year. A considerable amount of levelling was done in central and northern Manitoba. The Principal meridian was extended from township 80 to township 88, its northerly end being now about thirty miles south of the crossing of Churchill river. To the east of this meridian parts of the 21st, 22nd, 23rd and 24th base lines and of certain connecting meridian outlines have been run and a connection following the vicinity of Nelson river and the Hudson Bay railway has been established and the seaboard reached at Port Nelson.

The datum used to extend the levels into northern Manitoba, and along the Hudson Bay railway to the sea, has been derived from a long connection levelled up from the south. It originates at a bench-mark of the United States Coast and Geodetic Survey established at Stephen, Minnesota, about forty miles south of the international boundary. From there levels were carried northwesterly by the Geodetic Survey over railway lines by way of Emerson and Regina to Warman. From there levels were continued by this branch northerly along the Canadian Northern railway to Prince Albert, easterly to Hudson Bay Junction, northeasterly to Pas, and then 100 miles farther, along Hudson Bay railway, to the intersection of the 17th base line, which forms the north of township 64. Beyond this point the connection follows the 17th base line easterly to the Principal meridian, and then north and east along meridians and base lines to Port Nelson. The total length of this route, from Stephen, Minnesota, to the sea at Hudson Bay, is 1,580 miles. Connection has been made with the tide gauge at Port Nelson, but a comparison with mean sea-level has not yet been worked out.

Owing to deficiences in the original levels which had been run in previous seasons along the Second meridian from the crossing of Saskatchewan river to township 80, these levels were re-run this season. For the same reason, the levels previously run along the 15th base line west of this meridian are now being revised.

The original survey of the 2nd base line, which was made many years ago, was retraced this season from the Second meridian as far west as the Fourth meridian. Advantage was taken of this survey to run a line of levels along the base line over the prairie, no levels having been run in that district before. The only other line of levels run between the Second and Fourth meridians during the past year consisted of eleven ranges of the 16th base immediately to the west of the Second meridian.

This base line had been previously run east from the Third meridian and the survey of these ranges completed it between the meridians.

In addition to the levels over the prairie along the 2nd base line, a large mileage of prairie levels was run along the Fourth meridian during its retracement the levels extending from the international boundary to Saskatchewan river in township 53. No levels have been run along this meridian between townships 53 and 60, but north of the latter township, levels have been already carried along the meridian to lake Athabaska in township 115 which is 690 miles north of the international boundary.

In the country near Athabaska river and north of McMurray two surveyors were at work. One of these completed the parts of the 24th and 25th base lines westerly from the river to the Fifth meridian and the other ran the 26th base, from the Fourth meridian to the Fifth. The completion of these base lines has resulted in the levels along the two meridians being now connected to eight different base lines.

The Fifth meridian was not advanced this season. It had already been extended to township 112, a few miles north of where it crosses Peace river, about seventy miles east of Fort Vermilion; two surveyors were engaged on the survey of base lines west of this meridian. The first continued to survey the 26th and 27th base lines easterly to the Fifth meridian, completing the parts between the meridian and range 17 and range 9 respectively. The second surveyor ran the 29th base westerly from the extreme north end of the Fifth meridian to the longitude of the Sixth meridian. The latter meridian has not yet been surveyed north of township 90, so that no closing is as yet available for the westerly end of the levels of the 29th base line. This base line is the most northerly one yet surveyed. It passes about twenty-six miles north of Fort Vermilion settlement on Peace river.

The only levels run last season in the country west of the Sixth meridian comprise a line along that part of the west boundary of Peace River block, which extends from township 81 to township 84. This line afforded a much needed connection to sea-level for several hundreds of miles of levels in the southerly part of this block.

Although many base lines have been wholly or partly run between the Fifth and Sixth meridians, there is only one line of levels, namely, that along the 23rd base line, which extends across the entire distance between the meridians. The result is that there is only this one connection to sea-level for all the levels, amounting to 528 miles, run along the Sixth meridian and the base lines in Peace River block.

LINES OF PRECISE LEVELS.

Two level parties were employed in the field, one under Mr. L. O. R. Dozois, D.L.S., from May 13 to October 26, and the other under Mr. J. T. Carthew, D.L.S., from June 11 to August 7, after which date the party was in charge of Mr. E. W. Berry, D.L.S., until January 25, 1915.

One party under Mr. Dozois commenced work at Winnipeg and levelled along the Canadian Northern railway to Swan river, running spur lines of levels from Portage la Prairie to lake Manitoba, from Ochre river to lake Dauphin and from Sifton Junction to lake Winnipegosis. These levels amounted in all to 321 miles. Connections were also made along the line, run the previous season, between Swan River and Hudson Bay Junction. The line of levels from Winnipeg to Edmonton has now been completed. The route followed is all along the Canadian Northern railway by way of Portage la Prairie, Gladstone, Dauphin, Swan river, and Hudson Bay Junction to Prince Albert, then south to Warman and west to Edmonton. The distance from Winnipeg to Edmonton by this route is 958 miles. At Edmonton connection is made to a line from Calgary, making a total length of 1,157 miles of continuous levelling.

In running these levels along railway lines permanent bench-marks have been left at average distances of about five miles apart, at least one being

left near every railway station, whether the country is settled or not. In many cases two bench-marks have been left near the stations and where questions of transport allowed it, additional bench-marks have been left midway between stations. These bench-marks consist of copper bolts fixed in stone or concrete buildings or bridges, or in special concrete pillars. The elevation of every railway station, and of the water in every stream, is also determined, as well as the elevations of many of the road crossings. These are all taken as intermediate sights, after the elevations of the main line turning points have been recorded at the instrumental stations. They do not, therefore, interfere with the accuracy of the main line of levels.

A great difficulty in running precise levels arises from the liability of making clerical errors in the field record. The method used consists of a continuous summation of the separate rise or fall which occurs in each mile section. No regular rule can be followed in regard to the order in which the duplicate lines are run forward or backward over a section. In fact the order is necessarily not uniform. A careless reversal of the entry of direction of running a particular section may, therefore, lead to a rise being recorded as a fall, or vice versa. The same trouble of inversion may also occur through confusion in entering a foresight for a backsight. To reduce this danger, a method is being tried of having the recorder make independent approximate readings of the rod after the leveller has completed the precise readings at each instrumental station.

The other party under Mr. Carthew commenced work at Prince Albert and levelled over the branch line of the Canadian Northern Railway to Big River, a distance of eighty-five miles. It is the intention at some future date, to continue this line of levels northerly down the general course of Beaver river.

Work was next commenced at Hudson Bay Junction, and a single line of levels was run over the railway from there to Pas, a distance of eighty-seven miles. This had been already levelled in the previous year, but the elevations of the railway stations and many of the streams had been omitted and the distances betweeen bench-marks had been too long. The single line was run to remedy these matters, and generally to check the original line. No second, or check line, was run if this single line checked with the original determinations at the end of a mile section within one-tenth of a foot. In such case the original elevation was retained and the new line was used only to determine the intermediate new elevations. If a greater discrepancy occurred an investigation was made by further levellings.

On reaching Pas the total disagreement between the single line, the elevations of which were carried through independently, and the mean of the duplicates of the original line amounted to 0·130 foot, in addition to an error of 1·100 feet which was found to have been made in a certain mile of the original line. Correction has been made for the error of 1·100 feet but otherwise the original elevations have been retained.

The line of levels was continued from Pas northeasterly along the Hudson Bay railway. As this was a new line duplicate levels were run in the usual manner. This new line was extended to a point ninety-nine miles from Pas. Here work ended on November 10, and the party returned to Prince Albert. A single line of levels was run from Prince Albert to Hudson Bay Junction, a distance of 162 miles. This line had been run in the year 1912, but was now re-run for reasons similar to those stated for re-running the line from Hudson Bay Junction to Pas. The elevations of numerous streams had been omitted and were now recorded. The total discrepancy between this single line of levels and the mean of the original duplicate levellings amounted to 0·186 foot at the end of the 162 miles. No local error was discovered in the field work of the original line, and no change has been made in the original elevations.

The following tables show the lines of levels along meridians and base lines, and also the lines of precise levels, run from April 1, 1914 to March 31, 1915.

Meridian and Base Line Levels.

Line.	Townships or Ranges.	Surveyor.	Miles.
Second meridian east	85–88	G. H. Herriot	24
Second " "	89–92	B. W. Waugh	24
23rd base east of Second meridian east	1–11	G. H. Herriot	66
24th " " " "	1–10	B. W. Waugh	60
24th " " " "	11	G. H. Herriot	6
East outline, range 11, east of Second meridian east	89 92	"	24
Principal meridian	81–88	A. H. Hawkins	48
6th base line east of Principal meridian	10	A. M. Narraway	6
East outline of range 1 east	45–48	"	24
East " " 3 "	38–44	"	42
12th base line east of Principal meridian	2– 3	"	12
13th " " "	1– 3	"	14
13th " west "	13–14	T. H. Plunkett	10
14th " " "	11–16	"	30
19th " east "	1– 5	G. H. Herriot	30
East outline of range 11 east	81–84	B. W. Wangh	24
21st base line east of Principal meridian	10–11	"	12
21st " " "	12–20	G. H. Herriot	54
22nd " " "	1	A. H. Hawkins	6
22nd " " "	12–20	B. W. Waugh	54
22nd " " "	21–22	G. H. Herriot	11
22nd " west "	1	A. H. Hawkins	6
23rd " east "	21–22	B. W. Waugh	10
East outline of range 20 east	81–84	G. H. Herriot	24
East " " 20 "	85–88	B. W. Waugh	24
Second meridian	56–85	A. H. Hawkins	173
2nd base line west of Second meridian	1–30	A. G. Stuart	178
15th " " "	1–21	A. H. Hawkins	127
16th " " "	1–11	E. S. Martindale	66
2nd " " Third meridian	1–30	A. G. Stuart	178
Fourth meridian	1–53	"	318
24th base line west of Fourth meridian	12–25	G. H. Blanchet	83
25th " " "	13–25	"	76
26th " " "	1–25	F. V. Seibert	146
26th " " Fifth meridian	1–17	J. A. Fletcher	102
27th " " "	1– 9	"	51
29th " " "	1–24	J. R. Akins	142
West boundary, Peace River block	81–84	L. Brenot	24
Total			2,309

Lines of Precise Levels.

Line.	From	To	Railway.	Surveyor.	Miles.
P	Prince Albert	Big River	Can. Nor. Ry.	J. T. Carthew	85
Q	Winnipeg	Swan River	"	L. O. R. Dozois	321
J	Pas	17th base line.	Hudson Bay Ry.	E. W. Berry	99
		Total			505
		Lines Revised.			
G	Prince Albert	H. B. Junction	Can. Nor. Ry.	E. W. Berry	162
J	H. B. Junction	Pas	"	"	87
	Short lengths along other lines				25
		Total			274
		Total of all lines run during the year			3,088

Photo by H. S. Holcroft, D.L.S.

RUINS OF OLD AMMUNITION BUILDING—CHURCHILL.

The whole building except this one chamber is in ruins. About 150 yards away are the ruins of the Battery for which the Ammunition shed was built. This Battery, erected about 150 years ago by the Hudson's Bay Company, commanded the entrance to Churchill harbour.

Photo by H. S. Holcroft, D.L.S.

HUDSON'S BAY COMPANY'S STORE—YORK FACTORY.

Some of these buildings are more than 100 years old. They are constructed of heavy timber and are yet in good condition The building on the extreme left is the present local store, the other buildings being used as storehouses.

Work in Calgary Office.

All the level books, both those of the meridian and base line surveyors and those of precise level lines, have to be checked. The examination includes checking the reductions, and making a careful scrutiny of all places where the routine methods were not followed in the field work. This last is very laborious, but very important, as it is in such places that errors may enter the work.

As regards the books of meridian and base line levels, these are first examined in a preliminary way and a statement made out showing what additional information is required from the surveyor. This is usually concerned only with the chainage of the topographical features and sketches of the crossings of lakes and rivers. The books themselves are, as a rule, the only available source of information regarding any matters of actual elevation

The connection of the datum by the surveyor to the best available sea-level datum must then be investigated. This is generally very complicated since the connection is dependent on many lines run on different datum planes. The collating of these assumed datum planes has to be checked and revised again and again. The books are then checked page by page, and any clerical or other errors are noted.

A list of the bench-marks giving their positions, descriptions and elevations is next prepared. Each line is kept separate. The elevations of the bench-marks are the real foundation of the whole system. These are recorded in the field to hundredths of a foot. In compiling the lists of each line, when a surveyor has commenced his work off some previous line, the initial bench-mark heads the lists, and is given the same elevation as it has in the list of the previous line which has always been reduced to sea-level, if such a datum has been available. The same datum is used for all the bench-marks on the new line. When the line terminates by closing on a bench-mark of some other line as, for example, when a base line is run from one meridian to the next, the terminal bench-mark is listed at the end of the new line with the elevation carried through. A comparison of this with its elevation in the list of the line on which it was originally established, serves at once to show the closing error.

This method of listing each line independently places the lists in a form readily available for future adjustment, when sufficient circuits have been run in the field to clear the lines of all but small accidental errors, and it avoids the confusion which would inevitably follow a general adjustment made before sufficient work has been done in the field.

The elevations of the natural features along each line are also compiled in lists. These include the elevation of the ground at the foot of the section and quarter-section posts, about midway between them, and also the elevations of all streams and other water, the distances of each feature from the northeast corner of the particular section being stated. These lists are placed on file, and condensed lists giving, as a rule, only the ground at the northeast corner of each section and the more important other features, are compiled from them for publication.

The draft lists of both bench-marks and natural features are first made out with the elevations recorded in the field books, and then the necessary constants are applied to the draft elevations to reduce them to sea-level, and to correct any clerical errors carried forward inadvertently in the field books.

All lists are made out running north or west independently of the way the line was run in the field. This involves a good deal of extra work, but results in uniformity and clearness.

A profile of each line is made on a horizontal scale of 120 chains to one inch and a vertical scale of 250 feet to one inch. This is a ratio of 1-32, a more exaggerated one than that used on railway profiles, which latter is usually 1-20. The small horizontal scale used, however, requires a greater exaggeration than that shown on a railway profile, in order to clearly bring out small local inequalities.

The office work in connection with precise levels involves a mass of detail. It includes checking the summation of all the rod readings, and of the stadia intervals in each mile section, checking the transference to the abstract book of the rise and fall in each section, the stadia distance, and the partial discrepancies. The field notes of every mile of levels contain about 480 figures, all of which have to be checked in some form or another.

After the precise level books have been checked a list is prepared for each line giving the positions, descriptions and elevations of all the permanent bench-marks and a further list is made which includes all the other elevations, such as those of railway stations, streams, road crossings, etc. It has been the practice so far, to include in the latter lists the temporary bench-marks at the end of the mile sections. These temporary bench-marks are undoubtedly of great service for future local reference in the field where precision is not required.

The following table gives a summary of the work done in the office during the past twelve months. This is exclusive of the work of compilation of the general report on levelling, previously referred to, which involved the collating and reduction of 8,900 elevations spread over 9,689 miles of levels, and is also exclusive of the re-examination of books dealing with field work done previous to the last two seasons, which is continually going on.

It was supposed, when the levels were first inaugurated along meridians and base lines, that once the lists were made out no further reference would be made to the books but this has proved to be quite a mistake. Continual reference must be made to the original notes and this practice has undoubtedly done much to keep the office records of the whole system so remarkably free from error.

—	Original Meridian and Base Line Levels.	Original Precise Levels.	Other Levels.	Total.
FIELD BOOKS.				
Received from the field, April 1, 1914 to March 31, 1915	133	55	19	207
Miles of levels recorded in these	2,352	599	337	3,288
Field books, entirely examined	120	55	19	194
Field books, partly examined	29			29
BENCH-MARKS.				
Number of bench-marks compiled for the first time	2,837	568	29	3,434
Number of miles in which they occur	2,227	599	337	3,163
PROFILES.				
Number of sheets completed	62			62
Number of miles on same	2,401			2,401

REPORT OF L. O. R. DOZOIS, D.L.S.

PRECISE LEVELS FROM WINNIPEG TO SWAN RIVER.

(To accompany report of J. N. Wallace, D.L.S.)

I left Calgary on May 13, 1914, and reached Winnipeg on the 14th. From this date until the 18th the time was taken up in making preparations for field work.

Permission was obtained from the Canadian Northern railway to run the line of levels along their track from Winnipeg to Swan river, the conditions being the same as contained in an agreement which had been in force in former seasons. As this line runs within a short distance of lake Manitoba and lake Winnipegosis it was desirable that the elevation of the water in these lakes should be accurately determined. In the case of such large lakes the only satisfactory way to have their variations recorded is by gauge readings at frequent intervals, and to have the zero of the gauge connected to a known elevation above sea-level. In connection with this matter I consulted Mr. Scovil, Acting Chief Engineer of the Manitoba Hydrographic Survey. He agreed to have gauges placed at Delta on the shore of lake Manitoba, and at Winnipegosis on the shore of lake Winnipegosis, and also at the eastern and western sides of Meadow portage, which is a narrow stretch of land, about two miles wide, separating the two lakes. It was further arranged that I should establish bench-marks of as permanent a nature as possible to the shores of these lakes.

This arrangement was an additional benefit to us as it afforded a check on our levels between Delta and Winnipegosis, a distance of 190 miles. It has since been found that our levels and the water levels by way of the lakes as ascertained by Mr. Scovil, check within two-tenths of a foot.

The members of the party reported on the morning of May 18, and levelling operations were at once begun. As the levels were to begin from the middle of the city of Winnipeg it was not practicable to establish camp. The party, therefore, stopped at hotels until the levels were clear of the city. While levelling the central part of the city it was necessary to make use of the early hours of the morning, in order to avoid interference from the daily traffic. The afternoons were spent in levelling along the track, near the outskirts of the city.

Between Winnipeg and Portage la Prairie, a distance of fifty miles, the line runs through open prairie, and the work suffered much delay on account of high wind which prevailed day after day. It was also a source of trouble from Portage la Prairie to Gladstone, a distance of forty miles, although it was neither as strong nor as frequent. From Gladstone to the end of the line the track was for the greater part sheltered from the wind by timber. The summer of 1914 was remarkably dry for Manitoba, and the high temperature exceeded any that had been recorded for a number of years. Little or no time was lost through wet weather until the last month of field work, when several days were lost from this cause.

During this season a method of supplementary levelling was introduced to ensure against the occurrence of large errors. This was done by having the recorder make independent readings of the forward and backward rods at each instrument station, after I had completed the precise readings. His readings were recorded by me in a special book. He read only the middle wire, reading it to the nearest hundredth of a yard. These supplementary readings were made on the forward line only. At the end of every section of levelling, a comparison was made between the difference of elevation as shown by each book, special attention being paid to the sign of the difference of elevation.

This supplementary reading of the rod, and separate record, may be regarded as a semi-independent third line of levels run in conjunction with the regular duplicate forward and backward precise levels. It is not, of course, as good a check against error as an entirely independent line run by a different leveller at a different time, but it has proved very useful in quickly detecting a clerical error in the records which otherwise might not have been noticed until the books were checked in the office.

The progress of the levels suffered appreciably in taking the additional set of readings at each station. I think the retarding effect could safely be stated at ten miles a month of complete levels.

The permanent bench-marks between Winnipeg and Gladstone were established on foundations of buildings. Beyond Gladstone the country becomes more sparsely settled, and concrete pillars had to be made from there to the end of the line at Swan River. Pillars were also made along the branch from Sifton Junction to lake Winnipegosis.

The bench-mark established in foundations consists of a copper plug of a uniform diameter of three-quarters of an inch, and three and one-half inches long. A slit one-sixteenth inch deep is cut across the middle of one end. A hole seven-eighths inch diameter and three and three-quarter inches deep, is drilled in a sound part of the wall and filled with wet cement. The plug is pushed in until flush with the face of the wall, the excess cement being expelled. Before the cement has firmly set, the plug is turned on its axis and the slit made horizontal. This style of bench-mark can be made in fifteen minutes, and has firmly set in a few hours.

During the season seventy-seven permanent bench-marks were established; of these three were on bridge piers, twenty-five were on foundations of houses, and the remaining forty-nine were in concrete pillars.

Three permanent bench-marks were established on the branch from Delta Junction to lake Manitoba, but owing to the marshy nature of the lake shore no bench-mark of a permanent nature could be established closer than three miles to the lake.

One permanent bench-mark was established at lake Dauphin, and four were established on the branch to lake Winnipegosis, also one close to the lake shore for the convenience of the Hydrographic Survey.

The elevations of all the railway stations between Winnipeg and Swan River, amounting to a total of sixty, were recorded. In addition I determined the elevations of forty-eight streams and of thirty-three roads crossing the line of levels.

Several photographs of bench-marks were taken in order to enable them to be more readily found in future. Photographs are undoubtedly of considerable value when used with the descriptions, as they show many useful details which can not be stated in a description. The accumulated discrepancy between the forward and backward measures showed no marked tendency to increase in a positive or negative direction. It passed through zero twenty-five times during the season. The greatest positive accumulation of any one place was + 0·048 foot at 168 miles and the greatest negative accumulation was — 0·119 foot at the end of 246 miles. The final total discrepancy at the end of the line (280 miles) was — 0·0054 foot. The partial discrepancy for a mile section was positive in forty-seven per cent. and negative in fifty-three per cent. of the total number of sections. The discrepancy exceeded 0·010 foot in only twenty-five per cent of the sections.

The probable error of the mean of a mile section is 0·0029 foot, and the probable error of the mean for the whole length of 280 miles of main line is 0·048 foot.

The line was completed to Swan River on October 17, exactly five months from the date the work was begun from Winnipeg. During this period, 321 miles of levels were run. This is at the average rate of sixty-four miles per month. The total mileage is distributed as follows:—

	Miles.
Winnipeg to Swan River	280
Delta Junction to Lake Manitoba	15
Ochre River to Lake Dauphin	5
Sifton Junction to Lake Winnipegosis	21
	321

It should be remembered that in addition to the duplicate lines of levels a third approximate line was run by having the recorder make additional independent readings at each station.

From October 19 to 22, I was engaged on miscellaneous levels between Swan River and Hudson Bay Junction. The party was paid off at Hudson Bay Junction on October 23, and I left on the following day for Calgary, arriving there on the night of the 26th.

Report of E. W. Berry, D.L.S.

LEVELS ALONG CANADIAN NORTHERN AND HUDSON BAY RAILWAYS.

(To accompany report of J. N. Wallace, D.L.S.)

The work carried out by me during the past season comprised the running of levels along the Canadian Northern and Hudson Bay railways from Hudson Bay Junction to a point ninety-nine miles northeasterly from Pas, and also a line from Prince Albert to Hudson Bay Junction. In addition certain miscellaneous work was carried out on the branch line to Big River. These totalled in all 371 miles, of which 100 miles were original levels, and the remainder single lines of levels over the work of previous seasons.

I left Calgary on August 6, 1914, and reached Prince Albert the next day. Having engaged men there and secured materials for bench-marks, I left on August 10 for Hudson Bay Junction, where I arrived the same day.

A single line of levels along the Canadian Northern railway from Hudson Bay Junction to Pas was commenced on the 11th. The line of railway runs through a country which is largely composed of spruce and tamarack swamps. In the swampy sections the track yields to the pressure of a train or handcar and recovers its original elevation very slowly. This makes levelling difficult. Many of the temporary bench-marks of the previous season's work had moved more than a tenth of a foot, and on this account I had to run twenty miles twice.

The party consisted of eight men, consisting of leveller, recorder, cook, bench-mark man, two rod men, umbrella man, and a pilot for the handcar. We camped in tents, moving twice a week by freight train. The usual move was two sidings, about fourteen miles. The weather was fine during August, but some days were lost in September on account of heavy rains.

The twelve permanent bench-marks established the year before were in good condition with two exceptions. I made three new permanent bench-marks, and recorded the elevations of all the railway stations and of four streams, which had not been determined in the original line.

The work was completed on September 12. A precise level line running northeasterly along the Hudson Bay railway towards Port Nelson, was then commenced. The total length of the Hudson Bay railway from Pas to Port Nelson is about 440 miles. At the end of October, 1914, steel had been laid for 165 miles. It is expected that trains will be running along this line to a point 220 miles from Pas by the spring of 1915. As the road bed was new it was difficult to get precise results. The first twenty miles are on firm ground, with the exception of a few miles in the vicinity of Little Frog lake. This portion of the line had also been ballasted for some months before levelling started. From here on, the condition of the track got steadily worse for precise levelling, because the construction work was farther from completion. The country traversed by the line also becomes more swampy as it proceeds. For many miles there was no ballast yet laid and I had to use either the track, resting on the original mossy surface, or the surface itself, to afford a basis for the turning points. Ballasting was in progress from the time the work was begun until October 23, and interruptions from gravel and material trains occurred nearly every half hour. About October 23 the ballasting was completed. After this, interruptions were confined to the passing of trains of supplies and materials going to the end of steel.

Permanent bench-marks on concrete pillars were established at approximately the same distances apart as railway sidings. No bench-mark was placed within half a mile of any siding, and generally the distance between a siding and a bench-mark is from one to three miles. If bench-marks are placed close to sidings, they are liable to destruction when buildings are erected later. There are thirteen bench-marks or pillars, and two in the concrete foundations of railway tanks. For the first thirty miles, the usual temporary bench-mark, consisting of a railway spike in a telephone pole, was used. After this, the poles were found not to be firm enough for bench-marks, so marks cut in boulders and nails on stumps were used. Besides bench-marks the following elevations were recorded: base of rail at all sidings and bridges, and water level of streams and lakes crossed by the railway. Connection was made to bench-marks on the 15th, 16th and 17th base lines. The elevations of three streams and lakes were recorded, these being the only ones of any consequence crossed by the line.

The weather was rather unfavourable while this line was being run. High winds prevailed during most of September and October. There were some days lost on account of rain and heavy snow-storms. In some localities, also, the fog hangs low over swamp lands till late in the morning, making work impossible until it has disappeared.

For transport I depended on the trains of the Hudson Bay Construction company. For the accommodation of their workmen and the general public, the company ran trains about twice a week. Owing to the unfinished condition of the road-bed, however, no regular time-table was followed, and it was often impossible to find out within a day or two when a train would arrive. Trains left Pas at seven in the morning and generally reached the end of steel before midnight. On October 26 the train service stopped suddenly without notice (owing to a strike, as I subsequently learned); a heavy fall of snow made it impossible to use the hand car, as there were no trains running which would have cleared the track. Work was continued on foot until a permanent bench-mark was reached seven miles beyond our camp. On November 7, a train came down from Pas in charge of the Royal Northwest Mounted Police to bring out some parties farther down the line, who were short of provisions. Being unable to obtain any assurance that any more trains would be run during the winter, I arranged to have my outfit hauled back on this train, and returned to Pas on November 8.

Most of the party were paid off on our arrival at Pas. The outfit was shipped by freight to Prince Albert and on November 10, I left Pas arriving at Prince Albert the following day. A few days were then spent on office work until the camp outfit arrived from Pas. I then stored most of the outfit and arranged to re-level certain sections along the Canadian Northern railway line from Prince Albert to Big river. For this purpose I took two men with me, and hired a third man locally for a day or two when necessary. The sections which I re-levelled were scattered at intervals over the whole length of the line. A connection was also made from the end of the line at Big river to the levels of the 15th base line, using the water level of Cowan lake as a connecting link. This work was completed on December 1. We got board at a hotel at Shellbrook and at houses or stores in Canwood, Polwarth and Big River.

The next work undertaken was a second levelling of the line from Prince Albert to Hudson Bay Junction. This was commenced on December 5, 1914, and ended on January 20, 1915. The total distance is 162 miles. The party consisted of six men. We boarded at hotels until we passed Tisdale, and at lumber camps from Crooked river to Hudson Bay Junction. A single line was run through. Twenty-six sections of one mile each were, however, levelled twice because of disturbances of temporary bench-marks greater than 0·10 foot since the original levelling. These disturbances were found to be local, and did not affect the accuracy of the permanent bench-marks.

This line of railway is in open country from Prince Albert to Tisdale, a distance of eighty-nine miles, but east of Tisdale the country is wooded. The trains did not run as often this winter as usual. There was an express train from Winnipeg to Prince Albert every second day, which returned the following day. On the days that the express train did not run, there was a mixed train from Prince Albert, which went only as far as Mistatim. Our baggage was shipped by freight on the mixed, or by express on the passenger train.

In the open country during the two weeks before Christmas, we were inconvenienced by low temperatures accompanied by high winds. Except for this, conditions generally were favourable. The days were cloudy, and the track being frozen solid no difficulty was met from shifting turning points.

On this line there is a permanent bench-mark on a concrete pillar at every railway station and siding, and many such pillars have been placed midway between stations. The pillar at Weldon was destroyed when an elevator was built. One of the pillars near Hudson Bay Junction was also damaged, and a new pillar to take its place was made this season. All the other permanent bench-marks on this line were in good condition. The elevations of forty-nine streams crossing the line, which had been omitted in the original levels, were recorded during this re-levelling.

On January 21, 1915, I returned to Prince Albert and on the 22nd, I went to Debden on the Big River line and re-levelled a mile section near there. Next day I returned to Prince Albert, and connected the levels of the line to Hudson Bay Junction to a bench-mark of the Grand Trunk Pacific railway. On January 25, having paid off the party, I left for Calgary, where I arrived next day.

APPENDIX No. 61.

ABSTRACT OF THE REPORT OF B. W. WAUGH, D.L.S.

BASE LINE SURVEYS IN THE VICINITY OF THE LOWER NELSON RIVER, NORTHERN MANITOBA.

The route followed to reach the starting point of our survey at the northeast corner of tp. 80-9-E., was by steamer from Selkirk to Whiskey Jack portage, between Cross and Sipiwesk lakes, and from there by barge to Split lake and up Ripple river to our destination.

This district may now be more easily reached by the Hudson Bay railway. At the time of our survey the railway was built to within twenty miles of Manitou rapids in tp. 78-6-E.

Our main supplies for the season's work were cached at Manitou. These supplies were forwarded from time to time by canoes to different points along lower Nelson river.

During a season of high water a good canoe route from Split lake to Kettle rapids in tp. 85-19-E. is afforded by Landing river as far as tp. 81-11-E., across a short portage into Moosenose lake, thence down Moosetongue river to Butnau lake, down Butnau river to Cache lake, across a portage into Kettle river, and down this river to the Nelson. On account of the exceedingly low water this season we were compelled to freight by Nelson river, which, below Gull lake, is a hard and dangerous river to travel, the current there being very swift and the river containing many rapids.

During the winter we used dogs as a means of transportation. Our base of supplies was at Long Spruce rapids, on Nelson river, in tp. 85-20-E.

Work continued steadily on the line throughout the season, except for a few days in the latter part of January, when we had to wait for Nelson river to freeze over at its mouth and for favourable conditions for crossing. Owing to the tide and its numerous cross currents we were unable to take our levels across the river there with any degree of accuracy.

On February 3, having completed the 24th base line east to Hudson bay, we started homeward, travelling by dog trains to camp 33 of McMillan Bros., where we turned over our dogs and other transportation outfit to Mr. G. H. Herriot, D.L.S., and proceeded from there on McMillan's tote road to the end of the steel at camp 21, and thence on a construction train to Pas.

The country covered by our survey may be generally described as muskeg, with numerous open and tamarack swamps drained to a certain extent by Nelson river and its tributaries. The soil is decayed moss and black loam with the exception of a strip of land about a half mile wide, bordering on the Nelson, where the soil is clay and clay loam. The southern portion of the country is timbered with spruce and tamarack up to six inches in diameter, and of poor quality, but from the NE. cor. tp. 88-2-E. to Port Nelson the country is very lightly timbered with small burnt spruce, with occasional green spruce bluffs.

For the most part the surface is very level, though rough and hummocky in places, and no slopes of any extent occur except in the immediate vicinity of Nelson river.

This river from Split lake north varies in width from one-half to one and one-half miles, except at its mouth, where it gradually widens to seven or eight miles. The chief rapids along this portion of the river are: Birthday rapids, in tp. 84-12-E.,

with a drop of four feet; Gull rapids, in tp. 85-15-E., with a drop of seventy-five feet in three miles; Kettle rapids, in tp. 85-19-E., with a drop of about eighty feet; Long Spruce rapids, in tp. 85-20-E., with a drop of about seventy feet in a distance of seven miles; and Limestone rapids, which are a series of rapids from the mouth of Limestone river to Prairie point, a distance of about nine miles, with a drop of over one hundred and fifty feet. Along this portion of the river the ice, which piles up on the shores in the spring, is to be found there as late as August. The banks of the river are, for the most part, clay cut banks from forty to seventy-five feet high.

In sec. 33, tp. 80-11-E., our line crossed Landing river. The lower part of this stream is from five to ten chains in width, with no perceptible current. It has, however, two rapids which are passed by one portage. It is navigable by canoe at any season during open water. The upper part, on the other hand, is much narrower and very crooked, containing many rapids. It is navigable by canoe only during high water. The river empties into the southeastern arm of Split lake.

Gull lake in townships 84 and 85, ranges 13 and 14, is merely a widening of Nelson river, being about ten miles long and averaging one and one-half miles in width. The shores are for the most part high clay banks, but in some places they are low and swampy. There is quite a perceptible current in the lake causing bad seas in an easterly wind.

Butnau river, rising in Butnau lake, empties into the Nelson from the south in tp. 84-16-E. Its lower part has very low marshy banks, but the upper part has high banks (from which the river derives its name) fairly well wooded with good spruce up to eighteen inches in diameter. In high water it is good for canoeing.

Kettle river empties into the Nelson below Kettle rapids in tp. 85-19-E. It is about fifty feet wide and flows between clay banks from forty to fifty feet high, well wooded with spruce from six to eighteen inches in diameter. In low water it forms a very poor canoe route, being very swift and shallow, and necessitating many short portages, but in high water it is exceptionally good for down-stream travel. Kettle river was the first stream in which we found brook trout; they are very plentiful there and range from eight to eighteen inches in length.

Limestone river empties into the Nelson from the west just below the first Limestone rapid. It is about five chains in width with a current of from four to six miles per hour. Its banks are of clay from fifty to seventy-five feet high, wooded with scattered spruce and tamarack, up to eighteen inches in diameter, and occasional clumps of jackpine up to six inches in diameter. It has no rapids of note except at its mouth, but the current is so strong that in travelling up-stream by canoe tracking has to be resorted to. Rock sturgeon and trout are found near its mouth.

Weir river, rising in North Fishing lakes, is about 160 miles long and 150 feet wide, and empties into the Nelson from the west about thirty miles from its mouth. Its banks, on the upper portion are ten feet high, wooded with spruce and tamarack from six to eighteen inches in diameter. A tote road is now being cut along this river in order to haul the timber at North Fishing lakes and along its banks to Port Nelson. This appears to be the last river in which fresh-water fish are caught. The main catch is sucker with occasional trout, rock sturgeon, jackfish and whitefish. It forms a poor canoe route on account of its many rapids and its crookedness.

Roblin river and Cooper creek cross the Second meridian east in townships 91 and 92 respectively, and flowing in a northeasterly direction empty into a chain of small lakes. These lakes, viz.: Donald, Spence, Curtis, Fiddler, Dewar and numerous other smaller ones are said to contain jackfish, sucker and whitefish. They are bordered with thick spruce up to six inches in diameter of good quality. Roblin river flows from Spence lake of this group and paralleling Weir river, flows into the Nelson about eight miles below it. The river is about seventy feet wide with a strong current, but from the amount of water it carries it is improbable that it draws all the water from this chain of lakes. The banks of the river are low and timbered with spruce and tamarack from six to eighteen inches in diameter. The river is poor for canoeing.

A small belt of timber of about one square mile was found in tp. 88-22-E. It consists of spruce of good quality up to eighteen inches in diameter. This belt of timber together with scattered spruce and tamarack up to eighteen inches in diameter along Roblin, Weir, Limestone, Kettle, and Butnau rivers comprises the only timber of value found in the country.

No traces of mineral were seen and the only rock noticed consisted of a few outcroppings of granite along Nelson river.

Hay is found in small quantities along the banks of some of the smaller creeks flowing into the Nelson in the neighbourhood of Gull lake and above Kettle rapids. Prairie point, on Nelson river at Last Limestone rapids, is said to contain sixty acres of good hay land.

A large amount of water-power is available at the larger rapids along the Nelson, but in most cases they would require a long intake.

If the country were drained and stripped of its moss in order to let the frost out of the ground it would then be suitable for agricultural purposes, but it is not suitable in its present condition. The Nelson and its tributaries afford good drainage facilities.

On account of the extraordinarily poor year for game, we saw very little of any kind, but in ordinary seasons caribou, moose, and bear are said to be plentiful. Fox, marten, otter and mink are the chief fur-bearing animals.

Sturgeon, whitefish, jackfish and trout are the most valuable fish of the district.

The climate of 1914 was extraordinary for this country. There was very little rainfall in the summer and a fine open fall followed. The winter was not extremely cold, although the thermometer stayed at 20 degrees below zero nearly all November, December and January. In February the thermometer seldom registered below zero, and in this month there was an average depth of eighteen inches of snow.

APPENDIX No. 62.

RESULTS OF MAGNETIC OBSERVATIONS, 1914-15.

Table I.—Declination Observations.

Place.	Township.	Range.	Meridian.	Date.	Declination.	Observer.
					° ′	
At NE. cor. sec. 24	45	1	E.	Aug. 3, '14	14 02 7	A. M. Narraway.
At " 12	45	1	"	" 6, '14	13 38·9	"
41·26 S.- " 25	46	1	"	July 3, '14	14 06·5	"
44·99 S.- " 12	46	1	"	" 11, '14	03·6	"
2·25 E.- " 35	48	1	"	June 14, '14	13 57·0	"
42·65 S.- " 36	48	1	"	" 16, '14	14 13·0	"
69·34 E.- " 32	80	1	"	Nov. 15, '13	33·6	B. W. Waugh.
27·08 E.- " 34	80	1	"	" 18, '13	23·5	"
54·66 E.- " 36	80	1	"	" 21, '13	15 10·1	"
40·00 E.- " 31	44	2	"	Aug. 10, '14	13 53·5	A. M. Narraway.
60·00 E.- " 34	44	2	"	" 17 '14	46·8	"
17·29 E.- " 31	48	2	"	July 17, '14	42·4	"
47·00 E.- " 33	48	2	"	" 20, '14	15 14·1	"
51·19 E.-NW " 31	76	2	"	Feb. 3, '14	27·8	B. W. Waugh.
45·00 E.-NE " 34	80	2	"	Nov. 25, '13	16 31·7	"
39·97 S.- " 1	38	3	"	Oct. 9, '14	13 15·8	A. M. Narraway.
43·04 S.- " 13	39	3	"	" 2, '14	43·0	"
8·84 S.- " 12	39	3	"	" 6, '14	12 23·2	"
57·56 S.- " 1	41	3	"	Sept. 23, '14	12 54·4	"
21·85 S.- " 25	41	3	"	" 20, '14	46·0	"
40·00 E.- " 36	44	3	"	Aug. 20, '14	13 10·3	"
10·00 W.- " 35	44	3	"	" 25, '14	02·8	"
2·00 S.- " 36	44	3	"	" 27, '14	25·7	"
6·63 E.-NW " 31	80	3	"	Nov. 28, '13	15 54·7	B. W. Waugh
10·11 E.-N.E " 34	76	4	"	Feb. 19, '14	17 39·7	"
40·00 E.-NW " 32	80	4	"	Dec. 7, '13	14 30·0	"
7·00 E.-NE " 31	76	5	"	Feb. 23, '14	18 30·4	"
68·30 E.- " 31	80	5	"	Dec. 13, '13	13 37·4	"
2·39 E.- " 33	76	6	"	Feb. 28, '14	13 13·3	"
57·52 E.- " 35	80	6	"	Dec. 27, '13	10 33·4	"
*38·87 E.- " 31	81	7	"	" 31, '13	12 14·5	"
41·87 E.-NW " 31	80	9	"	Jan. 14, '14	13 27·2	"
47·55 E.-NE " 34	80	9	"	" 20, '14	14 16·1	"
At " 31	11	10	"	Oct. 17, '14	10 56·4	C. F. Aylsworth.
24·00 W.- " 8	12	10	"	" 23, '14	12 05·3	"
60·00 E.-NW " 18	12	10	"	" 24, '14	11·1	"
At NE " 18	12	10	"	" 27, '14	11 28·8	"
64·00 W " 30	12	10	"	" 27, '14	12 03·2	"
At " 30	12	10	"	" 27, '14	11 38·4	"
At SW " 18	12	10	"	" 29, '14	13 32·8	"
50·00 N.-NE " 6	12	10	"	" 29, '14	14·1	"
At NW " 19	12	10	"	" 29, '14	11 11·4	"
2·89 E.-NE " 31	20	10	"	May 20, '14	11·9	A. M. Narraway.
7·30 E.- " 34	20	10	"	" 25, '14	19·6	"
56·57 E.- " 35	20	10	"	" 26, '14	14·5	"
26·00 E.- " 31	13	11	"	Sept. 10, '14	10 19·4	C. F. Aylsworth.
17·00 S.- " 31	14	11	"	Aug. 31, '14	9 49·8	"
7·00 E.- " 31	14	11	"	" 31, '14	54·8	"
42·00 E.- " 31	14	11	"	" 31, '14	10 11·3	"
At " 8	14	11	"	Sept. 28, '14	9 31·0	"
30·00 S.- " 9	14	11	"	" 29, '14	35·6	"
25·00 N.-SE " 4	14	11	"	" 29, '14	10 24·2	"
At N.E. cor. sec. 36	48	1	Pr.	June 8, '14	14 04·0	A. M. Narraway.
46·34 N.- " 24	72	1	"	" 11, '13	24·0	B. W. Waugh.
57·51 N.- " 25	72	1	"	" 13, '13	15 06·2	"

RESULTS OF MAGNETIC OBSERVATIONS, 1914-15.—*Continued.*

Table I.—Declination Observations.—Continued.

Place.	Township.	Range.	Meridian.	Date.	Declination.	Observer.
					° ′	
52·12 N.-E. cor. sec.. 1	73	1	Pr.	June 16, '13	16 31 6	B. W. Waugh.
19·48 N.- " 12	73	1	"	" 17, '13	17 23·7	"
63·33 N.- " 12	73	1	"	" 18, '13	18 05·6	"
72·55 N.- " 13	73	1	"	" 19, '13	16 34 4	"
47·50 N.- " 36	73	1	"	" 21, '13	15 49·9	"
45·68 N.- " 1	74	1	"	" 23, '13	14 29·6	"
7·36 N.- " 12	74	1	"	" 24, '13	18·9	"
64·76 N.- " 12	74	1	"	" 26, '13	17·5	"
59·48 N.- " 13	74	1	"	" 27, '13	15 02·5	"
37·55 N.- " 24	74	1	"	" 28, '13	01·7	"
7·01 N.-SE. " 1	75	1	"	July 1, '13	13 08·6	"
63·64 N.- " 1	75	1	"	" 3, '13	16 41·5	"
39·53 N.-NE. " 1	75	1	"	" 4, '13	11 54·5	"
39·00 N.- " 12	75	1	"	" 5, '13	15 06·2	"
21·59 N.- " 13	75	1	"	" 7, '13	16 18·7	"
40·20 N.- " 13	75	1	"	" 8, '13	11·5	"
37·67 N.- " 21	75	1	"	" 9, '13	13 10 9	"
9·81 N.- " 25	75	1	"	" 10, '13	15 08·0	"
19·51 N.- " 36	75	1	"	" 12, '13	17 24·0	"
47·54 N.- " 36	75	1	"	" 14, '13	15 52·9	"
49·84 N.- " 24	76	1	"	" 17, '13	16 36·4	"
57·62 N.- " 25	76	1	"	" 19, '13	56·9	"
50·10 E.- " 36	76	1	"	" 23, '13	15 34·4	"
2·05 N.- " 12	77	1	"	" 21, '13	18 13·6	"
66·45 N.- " 12	77	1	"	" 24, '13	16 08·1	"
35·91 N.- " 1	78	1	"	Aug. 1, '13	17 58·3	"
16·03 N.- " 12	78	1	"	" 2, '13	16 31 7	"
45·72 N.- " 13	78	1	"	" 4, '13	15 49·8	"
79·43 N.- " 36	79	1	"	" 14, '13	15 19·3	"
35·83 N.- " 12	80	1	"	" 29, '13	23·9	"
15·06 E.- " 31	14	2	"	July 4, '14	12 17·3	R. C. Purser.
At " 34	14	2	"	" 7, '14	18·8	"
20·00 E.- " 35	14	2	"	" 7, '14	35·0	"
52·47 W.- " 33	76	2	"	Mar. 19, '14	14 58·6	B. W. Waugh.
5·00 N.-SE. " 1	15	3	"	Nov. 10, '14	12 18·1	R. C. Purser.
20·00 S.-NE. " 1	15	3	"	" 10, '14	22·6	"
70·09 N.- " 6	22	3	"	May 27, '14	13 57·4	C. F. Aylsworth.
20·00 N.. " 5	22	3	"	June 2, '14	22·2	"
At " 2	22	3	"	" 12, '14	00·5	"
At " 14	22	3	"	" 20, '14	11·0	"
At " 23	22	3	"	" 24, '14	12 32·0	"
12·00 E.- " 28	22	3	"	July 4, '14	13 14·3	"
30·00 W.- " 33	22	3	"	" 6, '14	17·4	"
50·00 E.- " 8	22	3	"	" 14, '14	10·4	"
At " 17	22	3	"	" 15, '14	03·3	"
At " 20	22	3	"	" 17, '14	26·1	"
30·00 E.- " 31	22	3	"	" 18, '14	27·4	"
At " 31	22	3	"	" 21, '14	30·5	"
80·89 W.- " 33	76	3	"	Mar. 24, '14	17 24·0	B. W. Waugh.
40·00 E.- " 1	22	4	"	May 27, '14	13 40·7	C. F. Aylsworth.
8·00 N.- " 24	22	4	"	June 23, '14	12 44·9	"
40·06 W.- " 3	23	5	"	May 20, '14	13 38·7	"
27·00 E.- " 2	23	5	"	" 20, '14	12 52·6	"
40·00 E.- " 3	23	5	"	" 20, '14	13 40·1	"
32·00 N.- " 6	69	7	"	Sept. 18, '14	15 52·0	P. E. Palmer.
41·00 N.- " 7	69	7	"	" 21, '14	14 08·0	"
20·00 N.- " 19	69	7	"	" 24, '14	15 05·8	"
37·00 E.- " 8	69	7	"	" 28, '14	36·9	"
30·00 N.- " 5	69	7	"	Sept. 29, '14	16 08·9	"
50·00 N.- " 17	69	7	"	" 30, '14	14 30·5	"
30·00 E.- " 21	69	7	"	Oct. 12, '14	15 31·7	"
36·00 N.- " 9	69	7	"	" 14, '14	14 36·9	"
6·00 S.- " 27	69	7	"	" 16, '14	15 14·9	"
56·00 E.- " 22	69	7	"	" 20, '14	03·6	"

RESULTS OF MAGNETIC OBSERVATIONS, 1914-15.—*Continued.*

Table I.—Declination Observations.—Continued.

Place.	Township.	Range.	Meridian.	Date.	Declination	Observer.
					° ′	
24·00 S.-NE cor. sec. 35	68	8	Pr.	Sept. 22, '14	14 33·8	P. E. Palmer.
37·00 S.- " 30	68	8	"	Oct 30, '14	16 04·4	"
56·00 W.- " 19	68	8	"	Nov. 5, '14	25·7	"
10·00 E.- " 20	68	8	"	" 6, '14	15 24·2	"
14·00 N.- " 17	68	8	"	" 7, '14	11·8	"
48·00 E.- " 11	69	8	"	Sept. 15, '14	14 45·3	"
44·00 E.- " 10	69	8	"	" 16, '14	15 55·9	"
20·00 N.- " 25	69	8	"	Oct. 2, '14	15 44·6	"
16·00 W.- " 11	69	8	"	Nov. 20, '14	01·3	"
43·00 S.- " 33	67	9	"	Dec 8, '14	14 35·5	"
25·00 W.- " 20	67	9	"	" 14, '14	15 04·7	"
6·00 N.- " 8	67	9	"	" 16, '14	13 38·1	"
12·00 N.- " 9	67	9	"	" 17, '14	14 53·7	"
48·00 W.- " 7	67	9	"	" 19, '14	18 20·5	"
39·00 S.- " 6	67	9	"	" 28, '14	12 53·8	"
10·00 W.- " 33	67	9	"	Nov. 28, '14	13 07·5	"
24·00 S.- " 25	68	9	"	" 16, '14	15 34·9	"
60·00 W.- " 24	68	9	"	" 17, '14	01·1	"
20·00 N.- " 12	68	9	"	" 19, '14	38·3	"
At " 36	68	9	"	" 23, '14	35·7	"
15·00 N.- " 11	68	9	"	" 30, '14	13 47·1	"
12·00 S.- " 23	68	9	"	Dec. 1, '14	14 40·8	"
5·00 S.- " 9	67	10	"	" 29, '14	13 46·9	"
28·66 W.- " 36	4	11	"	June 29, '13	13 20·0	A. G. Stuart.
28·66 W.- " 36	4	11	"	" 29, '13	20·5	"
24·00 W.- " 32	65	11	"	Aug. 19, '14	16 21·5	P. E. Palmer.
28·00 E.- " 32	65	11	"	" 26, '14	14 57·0	"
60·00 N.- " 12	65	11	"	" 22, '14	19 26·7	"
20·00 N.- " 18	65	11	"	" 28, '14	16 17·9	"
17·00 E.- " 7	65	11	"	" 30, '14	15 45·3	"
20·00 W.- " 19	65	11	"	" 31, '14	57·0	"
30·00 E.- " 22	65	11	"	Sept. 5, '14	20 39·5	"
60·00 E.- " 22	65	11	"	" 7, '14	22 17·6	"
20·00 E.- " 12	66	11	"	" 10, '14	18 05·8	"
12·00 S.- " 18	65	12	"	July 17, '14	16 54·1	"
21·00 W.- " 11	65	12	"	Aug. 3, '14	01·9	"
25·00 N.- " 1	65	12	"	" 4, '14	15 47·5	"
40·00 N.- " 12	65	12	"	" 6, '14	54·5	"
8·00 E.- " 22	65	12	"	" 7, '14	17 42·3	"
50·00 N.- " 27	65	12	"	" 10, '14	15·6	"
56·00 N.- " 14	65	12	"	" 11, '14	16 53·3	"
30·00 E.- " 23	65	12	"	" 13, '14	58·9	"
40·00 N.- " 24	65	12	"	" 14, '14	17 51·5	"
50·00 N.- " 26	65	12	"	" 15, '14	18 42·1	"
10·00 E.- " 35	65	12	"	" 17, '14	19 39·0	"
45·00 N.- " 34	48	13	"	June 13, '14	16 24·2	T. H Plunkett.
29·50 S.- " 36	51	13	"	May 29, '14	20·0	"
55·00 S.- " 25	51	13	"	" 31, '14	18·4	"
At " 36	52	13	"	" 23, '14	28·5	"
41·00 E.- " 36	52	13	"	" 22, '14	20·8	"
9·45 S.- " 1	52	13	"	" 28, '14	26·0	"
40·00 S.- " 24	52	13	"	" 26, '14	28·9	"
At " 11	65	13	"	July 7, '14	14 04·9	P. E. Palmer.
25·00 N.-NE cor. sec. 3	65	13	"	July 8, '14	19 11·2	"
61·50 E.- " 32	52	14	"	May 6, '14	17 10·4	T. H. Plunkett.
64·66 E.- " 33	52	14	"	" 8, '14	16 41·9	"
19·22 E.- " 36	52	14	"	" 11, '14	45·7	"
65·30 W.- " 36	68	14	"	Dec. 15, '13	11 03·6	G. H. Herriot.
45·00 W.- " 34	68	14	"	" 17, '13	17 45·9	"
30·00 E.- " 31	52	15	"	April 26, '14	16 40·2	T. H. Plunkett.
5·00 E.- " 32	52	15	"	" 27, '14	35·0	"
40·00 E.- " 32	52	15	"	" 28, '14	34·9	"
73·00 E.- " 32	52	15	"	" 28, '14	37·7	"
39·00 E.- " 33	52	15	"	" 29, '14	37·5	"

RESULTS OF MAGNETIC OBSERVATIONS, 1914-15.—*Continued.*

Table I.—Declination Observations.—Continued.

Place.	Township.	Range.	Meridian.	Date.	Declination.	Observer.
					° ′	
16·00 E.-NE cor. sec. 34	52	15	Pr.	April 30, '14	19·8	T. H. Plunkett.
30·00 E.- " 36	52	15	"	May 1, '14	22·2	"
49·60 E.- " 36	52	15	"	" 3, '14	25·9	"
42·47 E.- " 34	48	16	"	Mar. 22, '14	17 52·5	"
At " 35	63	16	"	Sept, 23, '14	59·3	J. S. Galletly.
10·00 E.- " 23	63	16	"	" 24, '14	18 03·8	"
60·00 W.- " 23	63	16	"	" 28, '14	09·3	"
20·00 S.- " 25	64	16	"	Aug. 27, '14	12·7	"
5·00 N.- " 2	64	16	"	Sept. 18, '14	33·2	"
20·00 E.- " 11	64	16	"	" 21, '14	17 36 8	"
51·00 E.- " 36	48	18	"	Mar. 17. '14	28·9	T. H. Plunkett.
16·00 E.- " 33	52	18	"	Jan. 22, '14	16 27·4	"
60·00 E.- " 36	52	18	"	" 27, '14	21·1	"
50·25 E.- " 32	19	19	"	April 28, '14	15 00·7	S. L. Evans.
2·42 E.- " 35	52	19	"	Jan. 20, '14	59·1	T. H. Plunkett.
15·00 S.- " 30	61	19	"	Dec. 31, '14	18 19·0	J. S. Galletly.
43·50 E.- " 32	52	20	"	Jan. 5, '14	17 38·3	T. H. Plunkett.
56·00 E.- " 34	52	20	"	" 9, '14	50·4	"
2·00 S.- " 22	61	20	"	Dec. 12, '13	57·1	P. B. Street.
4·00 N.- " 16	61	20	"	" 13, '13	18 05·1	"
61·63 E.- " 31	52	21	"	" 29, '13	17 17·1	T. H. Plunkett.
20·00 N.- " 27	60	21	"	Oct. 31, '13	56·7	P. B. Street.
16·00 N.- " 20	60	21	"	Dec. 18, '13	42·8	"
30·00 N.- " 11	61	21	"	Nov. 16, '13	18 06·6	"
52·00 N.- " 3	61	21	"	" 21, '13	17 34·1	"
4·00 S.- " 5	61	21	"	Dec. 17, '13	55·3	"
6·77 E.- " 34	48	22	"	Feb. 26, '14	57·2	T. H. Plunkett.
41·50 E.- " 34	52	22	"	Dec. 24, '13	17·2	"
22·00 N.- " 17	59	22	"	Feb. 15, '14	18 00·5	P. B. Street.
21·00 N.- " 3	60	22	"	Jan. 15, '14	17 47·3	"
18·00 N.- " 9	60	22	"	" 22, '14	18 07·8	"
46·95 E.- " 34	52	23	"	Dec. 20, '13	17 25·6	T. H. Plunkett.
42·00 N.- " 20	58	23	"	April 5, '14	18 07·8	P. B. Street.
44·00 N.- " 18	58	23	"	" 27, '14	21·4	"
20·00 S.- " 33	58	23	"	May 8, '14	43·3	"
27·29 E.- " 33	52	24	"	Dec. 11, '13	36·3	T. H. Plunkett.
61·21 E.- " 36	52	24	"	" 15, '13	17 27·7	"
25·00 S.- " 29	57	24	"	Mar. 12, '14	47·7	P. B. Street.
58·00 N.- " 33	57	24	"	" 13, '14	18 11·9	"
40·00 N.- " 6	61	24	"	Dec. 3, '14	17 28·9	J. S. Galletly.
40·00 N.- " 7	61	24	"	" 4, '14	18 00·9	"
50·00 N.- " 18	61	24	"	" 4, '14	17 52·9	"
At " 4	61	24	"	" 6, '14	18 14·7	"
35·00 N.- " 16	61	24	"	" 6, '14	03·5	"
36·00 E.- " 34	52	25	"	" 8, '13	16 55·9	T. H. Plunkett.
At " 31	52	26	"	Nov. 25, '13	17 37·8	"
5·29 E.- " 36	52	26	"	Dec. 1, '13	18 55 0	"
30·00 W.- " 21	54	26	"	Oct. 1, '13	19 00·0	P. B. Street.
5·00 N.- " 18	54	26	"	Oct. 4, '13	02·8	"
At " 20	54	26	"	" 5, '13	18 29·9	"
At " 20	54	26	"	" 5, '13	34·0	"
6·00 N.- " 27	9	27	"	July 27, '14	16 10·4	R. C. Purser.
65·83 E.- " 31	48	27	"	Sept. 7, '13	17 43 6	T. H. Plunkett.
32·72 E.- " 36	48	27	"	" 11, '13	18 11·4	"
20·00 N.- " 20	53	27	"	Aug. 28, '13	20 01·8	P. B. Street.
47 00 N.- " 3	54	27	"	" 4, '13	18 14·3	"
55·00 N.- " 11	54	27	"	Sept. 5, '13	19 03·3	"
At " 35	55	27	"	Oct. 21, '14	18 22·5	J. S. Galletly.
At " 34	55	27	"	" 23, '14	30·3	"
40·00 W.- " 33	55	27	"	" 24, '14	21·1	"
55·00 N.- " 35	55	27	"	" 29, '14	19 18·3	"
45·00 W.- " 31	56	27	"	" 7, '14	24·5	"
60 00 S.- " 28	56	27	"	" 8, '14	16 04·4	"
40·00 N.- " 20	56	27	"	" 13, '14	17 51·1	"

RESULTS OF MAGNETIC OBSERVATIONS, 1914-15.—*Continued.*

Table I.—Declination Observations.—Continued.

Place.	Township.	Range.	Meridian.	Date.	Declination.	Observer.
					° ′	
At NE. cor. sec. 21	56	27	Pr.	Oct. 14, '14	14 50·9	J. S. Galletly.
At " 28	56	27	"	" 15, '14	17 47·0	"
At " 27	56	27	"	" 16, '14	18 29·0	"
At " 23	56	27	"	" 26, '14	30·8	"
30 00 W.- " 10	56	27	"	" 31, '14	17 27·5	"
68·24 E.- " 36	52	28	"	Nov. 19, '13	19 17·7	T. H. Plunkett.
At " 12	49	30	"	Jan. 31, '14	19 18·8	P. E. Palmer.
At " 20	50	30	"	Mar. 12, '14	18 20·9	"
At SE " 5	51	30	"	Feb. 23, '14	17 21·2	"
20.00 N.- " 5	51	30	"	" 24, '14	16 20·2	"
At " 1	51	30	"	" 5, '14	17 35·6	"
At NE. " 12	5	31	"	Sept. 4, '13	16 45·1	A. G. Stuart.
At " 12	5	31	"	" 4, '13	39·1	"
At " 12	5	31	"	" 4, '13	16 36·6	"
At " 12	5	31	"	" 4, '13	41·6	"
16 35 S.- " 12	6	31	"	" 7, '13	00·2	"
16·35 S.- " 12	6	31	"	" 7, '13	15 57·7	"
At " 1	8	31	"	" 10, '13	29·7	"
At " 1	8	31	"	" 10, '13	34·6	"
At E. Bdy. sec. 1	9	31	"	" 12, '13	21·2	"
8·09 S.-NE. cor. sec. 36	10	31	"	" 16, '13	16 00·1	"
8·09 S.- " 36	10	31	"	" 16, '13	00·7	"
At " 29	21	31	"	June 16, '14	18 10·0	R. C. Purser.
40·00 E.- " 29	21	31	"	" 16, '14	17 59·9	"
20·00 W.- " 36	50	31	"	Jan. 16, '14	16 42·4	P. E. Palmer.
96·00 W.- " 36	50	31	"	" 17, '14	17 21·2	"
56·75 W.- " 32	4	1	2	June 12, '14	16 16·3	A. G. Stuart.
36·00 N.- " 32	48	1	2	" 18, '13	19 09·4	P. E. Palmer.
36·00 N.- " 32	48	1	2	" 24, '13	07·4	"
40·00 S.- " 28	48	1	2	July 2, '13	24·8	"
61·64 S.- " 18	48	1	2	Aug. 18, '13	43·5	"
22·52 W.- " 8	48	1	2	" 20, '13	20 30·5	"
22·17 S.- " 6	48	1	2	" 21, '13	19 44·8	"
At NE. " 8	49	1	2	June 26, '13	46·0	"
6·35 N.- " 3	50	1	2	Aug. 11, '13	07·2	"
22·00 E.- " 11	50	1	2	" 12, '13	15·0	"
16·40 E.- " 31	60	1	2	June 9, '14	20 27·4	E. S. Martindale.
22·50 E.- " 33	60	1	2	" 10, '14	19 20·3	"
8·00 N.- " 13	68	1	2	Jan. 6, '13	20 20·0	E. W. Robinson.
33·00 N.- " 25	68	1	2	" 18, '13	19 35·0	"
58·57 N.- " 1	69	1	2	" 21, '13	20 11·9	"
63·35 N.- " 12	69	1	2	" 22, '13	27·6	"
20·55 N.- " 24	69	1	2	" 24, '13	19 50·0	"
41·22 N.- " 25	69	1	2	" 25, '13	20 21·7	"
13·16 N.- " 1	70	1	2	Feb. 4, '13	20 32·7	"
49·66 N.- " 1	70	1	2	" 5, '13	41·8	"
37·77 N.- " 12	70	1	2	" 6, '13	21 01·8	"
31·75 N.- " 25	70	1	2	" 8, '13	19 31·6	"
14·17 N.- " 36	70	1	2	" 10, '13	21 22 3	"
67·24 N.- " 36	70	1	2	" 11, '13	18 50·0	"
61·39 N.- " 13	71	1	2	" 15, '13	20 15·2	"
41·97 N.- " 24	71	1	2	" 17, '13	30·9	"
8·55 N.- " 25	71	1	2	" 18, '13	21 30·1	"
64·03 N.- " 25	71	1	2	" 19, '13	47·1	"
12 34 N.- " 1	72	1	2	" 21, '13	20 16·2	"
22·96 N.- " 12	72	1	2	" 22, '13	22 50·5	"
78·16 N.- " 12	72	1	2	" 24, '13	20 15·5	"
42·14 N.- " 24	72	1	2	" 25, '13	23 39·5	"
7·67 N.- " 25	72	1	2	" 27, '13	20 41·7	"
12·94 N.- " 36	72	1	2	" 28, '13	21 56·0	"
55·75 N.- " 13	73	1	2	Mar. 3, '13	22 43·3	"
27·59 N.- " 25	73	1	2	" 4, '13	15·0	"
76·97 N.- " 36	73	1	2	" 6, '13	23 52·1	"
77·83 N.- " 12	74	1	2	" 8, '13	25 06·8	"

RESULTS OF MAGNETIC OBSERVATIONS, 1914-15.—*Continued.*

Table I.—Declination Observations.—Continued.

Place.	Township.	Range.	Meridian.	Date.	Declination.	Observer.
					° ′	
54·24 N.-NE. cor. sec. 36	74	1	2	Mar. 11, '13	29 57·5	E. W. Robinson.
60·27 N.- " 1	74	1	2	" 7, '13	22 21·7	"
37·30 N.- " 1	75	1	2	" 12, '13	25·1	"
46·20 N.- " 12	75	1	2	" 13, '13	21 25 6	"
80·32 N.- " 12	75	1	2	" 14, '13	20·0	"
8·00 N.- " 24	75	1	2	" 15, '13	20 46·5	"
25·72 N.- " 25	75	1	2	" 17, '13	45·8	"
7·50 N.- " 1	76	1	2	" 18, '13	51·1	"
11·74 N.- " 12	76	1	2	" 19, '13	44·8	"
13·57 N.- " 13	76	1	2	" 20, '13	35·7	"
31·55 N.- " 24	76	1	2	" 22, '13	44·2	"
28·10 N.- " 26	76	1	2	" 24, '13	52·2	"
65·82 N.- " 1	77	1	2	" 26, '13	48·6	"
40·00 N.- " 24	77	1	2	" 27, '13	40·8	"
50·00 N.- " 25	77	1	2	Apr. 1, '13	51·3	"
11·00 W.- " 13	78	1	2	" 4, '13	21 07·3	"
9·00 N.- " 12	79	1	2	" 11, '13	20 36·5	"
*22·00 N.- " 1	80	1	2	" 16, '13	21 05 0	"
34·00 N.- " 12	81	1	2	" 23, '13	20 45·0	"
6·00 N.- " 13	82	1	2	" 29, '13	50·7	"
47·00 N.- " 1	83	1	2	May 3, '13	21 13 5	"
69·00 N.- " 12	83	1	2	May 5, '13	19 41 2	"
57·00 N.- " 13	83	1	2	May 7, '13	20 49 1	"
25·09 N.- " 36	84	1	2	May 10, '13	20 54 2	"
12·00 N.- " 1	85	1	2	May 12, '13	21 49·8	"
46·50 W.- " 35	4	2	2	June 12, '14	16 23 3	A. G. Stuart.
46·50 W.- " 35	4	2	2	June 12, '14	25·2	"
27·70 W.- " 34	47	2	2	Aug. 25, '13	19 35·4	P. E. Palmer.
69·00 E.- " 23	47	2	2	Sept. 19, '13	01·7	"
6.00 W.- " 7	47	2	2	" 27, '13	45·4	"
26·66 E.- " 9	47	2	2	" 30, '13	28·5	"
16·00 S.- " 5	47	2	2	Oct. 2, '13	31·0	"
50·95 S.- " 24	48	2	2	Aug. 26, '13	18 50·2	"
7·87 W.- " 11	48	2	2	" 19, '13	19 24 2	"
24·00 N.- " 12	49	2	2	July 4, '13	34·4	"
11·70 E.- " 34	60	2	2	June 1, '14	53 3	E. S. Martindale.
41·72 W.- " 33	4	3	2	" 15, '14	17 01·8	A. G. Stuart.
41·72 W.- " 33	4	3	2	" 15, '14	02 2	"
62·68 N.- " 3	46	3	2	Oct. 11, '13	19 44·3	P. E. Palmer.
44·32 N.- " 4	46	3	2	" 13, '13	31·1	"
12·53 S.- " 24	47	3	2	Sept. 26, '13	34·0	"
76·75 W.- " 11	47	3	2	Oct. 8, '13	14·8	"
At SE. " 1	47	3	2	" 9, '13	17·3	"
12·00 W.- " 3	47	3	2	Dec. 19, '13	41·3	"
41·00 S.- NE. " 25	48	3	2	Aug. 30, '13	18 12·6	"
77·50 S.- " 13	48	3	2	Sept. 2, '13	17 37·8	"
At S.- " 36	48	3	2	Aug. 29, '13	35·6	"
16·40 N.- " 13	48	3	2	Sept. 1, '13	34·0	"
58·40 E.- " 31	60	3	2	May 19, '14	21 14·6	E. S. Martindale.
13·50 W.- " 35	4	4	2	June 16, '14	17 58·0	A. G. Stuart.
13·50 W.- " 35	4	4	2	June 16, '14	56·0	"
43·00 S.- " 13	47	4	2	Dec. 9, '13	19 51·3	P. E. Palmer.
22·52 W.- " 35	4	5	2	June 17, '14	19 03·0	A. G. Stuart.
15·50 E.- " 35	60	5	2	May 13, '14	50·4	E. S. Martindale.
57·01 W.- " 34	4	6	2	June 18, '14	18 08·6	A. G. Stuart.
57·01 W.- " 34	4	6	2	" 18, '14	09·4	"
20·26 E.- " 36	60	6	2	Apr. 30, '14	20 40·9	E. S. Martindale.
53·15 W.- " 36	4	7	2	June 19, '14	17 59·5	A. G. Stuart.
At " 35	4	9	2	" 22, '14	45·5	"
74·72 W.- " 31	4	10	2	" 24, '14	55 2	"
74·72 W.- " 31	4	10	2	" 24, '14	56·3	"
At " 27	48	10	2	Oct. 8, '14	19 45·9	J. H. McKnight.
At " 33	48	10	2	Apr. 9, '13	15 59·4	G. J. Lonergan.
67·41 W.- " 36	4	11	2	June 24, '14	17 57 1	A. G. Stuart.

RESULTS OF MAGNETIC OBSERVATIONS, 1914-15.—*Continued.*

Table I.—Declination Observations.—Continued.

Place.	Township.	Range.	Meridian.	Date.	Declination.	Observer.
					° ′	
60·00 W.-NE. cor. sec. 9	26	11	2	Sept. 16, '14	19 02·6	W. A. Fletcher.
50·00 W. }						
45·00 S.- } " 26	26	11	2	" 23, '14	03·2	"
77·00 W.- " 36	4	12	2	June 25, '14	18 21·2	A. G. Stuart.
41·50 N.- " 21	25	12	2	July 4, '14	57·2	W. A. Fletcher.
At " 9	26	12	2	Sept. 10, '14	19 11·1	"
40·00 N.- " 21	31	12	2	Aug. 31, '14	32·6	J. H. McKnight.
At " 11	32	12	2	Sept. 5, '14	32·4	"
22·70 N.- " 14	33	12	2	Aug. 20, '14	08·7	"
12·00 E.- " 31	60	12	2	Mar. 22, '14	21 27·9	E. S. Martindale.
41·00 N.- " 9	25	13	2	July 21, '14	19 21·6	W. A. Fletcher.
40·00 N.- ¼ cor. N. by sec. 10	26	13	2	Aug. 31, '14	17·2	"
40·00 N.- ¼ cor. N. by sec. 10	26	13	2	" 30, '14	11·2	"
40·00 W.- SE. cor. sec. 3	27a	13	2	" 20, '14	17·0	"
At NE. cor. sec. 16	27	13	2	Oct. 5, '14	17·3	"
41·50 N.- " 21	27	13	2	" 14, '14	17·0	"
41·00 E.- " 20	25	14	2	July 23, '14	39·6	"
At " 21	26	14	2	" 26, '14	26·8	"
10·50 N.- " 4	27a	14	2	Aug. 9, '14	22·8	"
64·67 E.-NE. cor. sec. 36	60	14	2	Mar. 17, '14	21 31·3	E. S. Martindale.
64·67 E.- " 36	60	14	2	" 17, '14	28·0	"
20·00 W.- " 8	37	15	2	Sept. 19, '14	19 44·7	J. H. McKnight.
7·00 N.- " 36	37	15	2	" 26, '14	20 20·3	"
10·82 W.- " 35	60	15	2	Mar. 11, '14	20 33·5	E. S. Martindale.
10·82 W.- " 35	60	15	2	" 11, '14	25·1	"
75·0 W.- " 36	4	16	2	July 1, '14	18 15·5	A. G. Stuart.
At " 11	37	16	2	Aug. 6, '14	19 58·7	J. H. McKnight.
40·00 S.- " 29	37	16	2	" 8, '14	56·0	"
64·37 E.- " 33	60	16	2	Feb. 28, '14	22 24·2	E. S. Martindale.
20·70 E.- " 35	60	16	2	Mar. 2, '14	21 42·7	"
20·70 E.- " 35	60	16	2	" 3, '14	43·5	"
20·70 E.- " 35	60	16	2	" 3, '14	43·7	"
45·14 E.- " 35	60	16	2	" 5, '14	28·9	"
40·00 W.- " 34	4	17	2	July 2, '14	18 05·1	A. G. Stuart.
15·00 N.-SE " 1	35	17	2	June 13, '14	19 55·2	J. H. McKnight.
37·00 W.- " 1	35	17	2	" 15, '14	54·3	"
29·00 W.-NE " 11	35	17	2	" 16, '14	20 12·8	"
33·00 W.- " 20	35	17	2	" 19, '14	19 43·0	"
40·00 N.- " 16	37	17	2	July 29, '14	20 00·0	"
26·94 E.- " 31	60	17	2	Feb. 17, '14	22 19·2	E. S. Martindale
59·23 E.- " 36	60	17	2	" 25, '14	38·6	"
20·00 W.- " 36	4	18	2	July 3, '14	18 11·1	A. G. Stuart.
32·00 N.- " 1	33	18	2	Sept. 15, '14	20 16·3	J. H. McKnight.
31·20 W.- " 20	36	18	2	June 29, '14	19 56·3	"
At " 17	37	18	2	" 30, '14	58·5	"
65·50 W.- " 29	38	18	2	July 15, '14	54·4	"
63·00 W.- " 8	38	18	2	" 16, '14	46·3	"
46·60 N.- " 12	38	18	2	" 24, '14	59·6	"
17·00 S.- " 5	40	18	2	June 11, '14	31·3	R. C. Purser.
36·83 S.- " 5	40	18	2	" 12, '14	27·4	"
1·47 E.- " 35	60	18	2	Feb. 10, '14	24 39·7	E. S. Martindale.
52·50 E.- " 35	60	18	2	" 13, '14	23 59·5	"
7·99 W.- " 35	4	19	2	July 6, '14	18 14·6	A. G. Stuart.
At station 4, sec. 28	4	19	2	" 5, '14	46·5	C. Rinfret.
" 4, " 28	4	19	2	" 6, '14	40·5	"
" 4. " 28	4	19	2	" 9, '14	46·1	"
Sta. 4, Traverse MacDonaugh L sec. 19.	5	19	2	" 14, '14	54·1	"
" " 19.	5	19	2	" 17, '14	49·1	"
" " 19.	5	19	2	" 18, '14	47·5	"
At station 2, sec. 4	6	19	2	" 19, '14	13·0	"
" 2, " 4	6	19	2	" 19, '14	27·4	"
" 2, " 4	6	19	2	" 20, '14	34·2	"
" 2, " 4	6	19	2	" 22, '14	14·2	"

RESULTS OF MAGNETIC OBSERVATIONS, 1914-15.—*Continued.*

Table I.—Declination Observations.—Continued.

Place.	Township.	Range.	Meridian.	Date.	Declination.	Observer.
					° ′	
Sta. 3, Traverse dry lake section 15.. ...	8	19	2	July 23, '14	19·1	C. Rinfret.
" " 15.....	8	19	2	" 25, '14	26·1	"
10·48 bear. 312-01 NE cor. sec. 34.....	9	19	2	" 27, '14	39·2	"
10·48 " 312-01 " 31.....	9	19	2	" 27, '14	42·6	"
10 48 " 312-01 " 34	9	19	2	" 28, '14	45·8	"
20·00 N.-SE. cor. sec. 16.....	23	19	2	Oct. 26, '14	19 20·6	R. C. Purser.
10·00 E. N.E " 22.....	23	19	2	" 26, '14	23·6	"
5·00 S.-¼ E. By sec. 7.....	23	19	2	" 28, '14	18 52·0	"
40·00 S.-NE cor. sec. 5	38	19	2	July 5, '14	19 40·2	J. H. McKnight.
At " 5.....	38	19	2	" 6, '14	42·7	"
73 88 W.- " 31.....	4	21	2	" 11, '14	18 21·0	A. G. Stuart.
At " 35.....	5	21	2	Nov. 27, '14	17 49·8	R. C. Purser.
At M. " 36	9	21	2	July 29, '14	18·19·6	C. Rinfret.
" 36.....	9	21	2	" 30, '14	37·2	"
14·85 E.- " 32.....	60	21	2	Nov. 18, '13	22 57·6	E. S. Martindale.
37·81 E.- " 35	60	21	2	Dec. 10, '13	55·7	"
At Station 3, sec. 10.....	9	22	2	Aug. 3, '14	18 11·6	C. Rinfret.
At 10.	9	22	2	" 3, '14	16·0	"
At " 10.....	9	22	2	" 7, '14	07 8	"
At ¼ E. By, sec. 29.....	25	22	2	Oct. 20, '14	19 49·4	R. C. Purser.
10·00 N.-NE cor. sec. 29..... ..	25	22	2	" 20, '14	50 6	"
10·00 N.- " 29.....	25	22	2	" 21, '14	55·7	"
5·00 N.-¼ E. By. sec. 32	25	22	2	" 21, '14	59·4	"
5·00 S.-NE. cor. sec. 32.....	25	22	2	" 21, '14	58·2	"
At " 30..... ..	25	22	2	" 23, '14	52·1	"
At " 19...	25	22	2	" 24, '14	53·4	"
19·99 E,- " 32...	56	22	2	Sept. 19 '13	22 49 5	E. S. Martindale.
11·40 E.- " 33.....	56	22	2	" 20, '13	28·3	"
75·02 E.- " 35....	56	22	2	" 23, '13	03·2	"
25·00 N.- " 10.....	8	23	2	Aug. 8, '14	19 05·5	C. Rinfret.
2·60 bear. 138°-40′ NE. cor. sec. 10....	8	23	2	" 9, '14	05·2	"
2·60 " " 10....	8	23	2	" 9, '14	04·2	"
2·60 " " 10....	8	23	2	" 10, '14	10·2	"
10·00 N.-NE. cor. sec. 34.....	19	23	2	June 7, '14	50·4	B. H. Segre.
10·00 N.- " 34.	19	23	2	" 8, '14	51·8	"
10·23 E.- " 31.....	56	23	2	Sept. 6, '13	23 18·6	E. S. Martindale.
17·33 E.- " 32	60	23	2	Oct. 25, '13	23·9	"
9·77 E.- " 34	60	23	2	" 28, '13	15·4	"
79·25 E.- " 35.....	60	23	2	Nov. 1, '13	30·0	"
24·16 E.- " 36	60	23	2	" 3, '13	30·5	"
Sta. 3 traverse Olive lake, sec. 32...	8	24	2	Aug. 12, '14	19 18·3	C. Rinfret.
" " 32. ...	8	24	2	" 13, '14	07·3	"
" " 32.....	8	24	2	" 14, '14	17 9	"
15·55 E.-NE. cor. sec. 9.....	8	24	2	" 19, '14	29·9	"
Sta. 2 sec. 10	8	24	2	" 20, '14	17·3	"
At station 2, sec. 10.....	8	24	2	" 20, '14	19 30·5	"
" " 10.....	8	24	2	" 20, '14	21·9	"
At NE. cor. sec. 33.....	19	24	2	June 11, '14	20 25·0	B. H. Segre.
At " 33..... .	19	24	2	" 14, '14	26·8	"
At " 33.....	19	24	2	" 14, '14	25·9	"
52 50 E.-NE. cor. sec. 31	56	24	2	Aug. 27, '13	22 32·8	E. S. Martindale.
73·47 E.- " 34..... ..	56	24	2	Sept. 4, '13	23 02·9	"
44·99 E.- " 35.....	56	24	2	" 5, '13	01·6	"
29·52 E.- " 35.....	60	24	2	Oct. 21, '13	22 56·5	"
1·00 N.- " 28.....	6	25	2	Dec. 19, '14	18 39·3	R. C. Purser.
40·00 S.- " 8..... .	8	25	2	Aug. 26, '14	19 12.5	C. Rinfret.
40·00 S.- " 8..... .	8	25	2	" 26, '14	19 02·1	"
40·00 S.- " 8.....	8	25	2	" 26, '14	05·5	"
At " 34..... .	17	25	2	June 30, '14	20 01·7	B. H. Segre.
52·87 E.- " 32.	56	25	2	Aug. 19, '13	23 34·8	E. S. Martindale.
12·54 E.- " 33.....	56	25	2	" 20, '13	22 45·1	"
31 19 E.- " 33.....	56	25	2	" 21, '13	38·8	"
15·40 E.- " 35.....	56	25	2	" 22, '13	49·9	"
21·51 E.- 34.....	60	25	2	Oct. 7 '13	23 30·7	"

RESULTS OF MAGNETIC OBSERVATIONS, 1914-15.—*Continued.*

Table I.—Declination Observations.—Continued.

Place.	Township.	Range.	Meridian.	Date.	Declination.	Observer.
					° ′	
68·72 E.-NE cor. sec. 34	60	25	2	Oct. 8, '13	39·4	E. S Martindale.
At NE " 35	4	26	2	July 17, '14	18 51·9	A. G. Stuart.
40·00 E.- " 20	39	26	2	Aug. 26, '14	21 28·3	R. Neelands.
At Centre sec 24	39	26	2	Sept. 14, '14	39·5	"
At NE. cor. sec. 10	41	26	2	" 20, '14	19 38·3	"
40·00 S.- " 11	49	26	2	Jan. 2, '14	22 26·6	"
35·3 N.- " 1	49	26	2	" 9, '14	23 02·2	"
6·99 E.- " 33	60	26	2	Oct 9, '13	17·8	E. S. Martindale.
6·99 E.- " 33	60	26	2	" 11, '13	22 57·3	"
At Sta. 4 sec 22	12	27	2	Oct. 14, '14	19 56·9	C. Rinfret.
" 22	12	27	2	" 11, '14	51·7	"
" 22	12	27	2	" 14, '14	54·3	"
65·00 S.-NE. cor. sec. 11	18	27	2	July 5, '14	58·4	B. H. Segre.
65·00 S.- " 11	18	27	2	" 5, '14	20 04·4	"
65·00 S.- " 11	18	27	2	" 5, '14	06·2	"
65·00 S.. " 30	19	27	2	" 19, '14	12·9	"
65·00 S.. " 30	19	27	2	" 19, '14	11·8	"
65 00 S.- " 32	25	27	2	Oct. 17, '14	38·6	R. C. Purser.
At Centre " 4	46	27	2	June 13, '14	22 42 0	R. Neelands.
0·50 E.-NE " 33	56	27	2	July 15, '13	23 08·2	E. S. Martindale.
47·26 E.- " 34	56	27	2	" 17, '13	17·6	"
16·65 E.- " 35	56	27	2	" 18, '13	23·3	"
19·97 E.- " 36	56	27	2	" 23, '13	27·5	"
67·58 E.. " 36	60	27	2	Oct. 10, '13	28·9	"
71·00 W.- " 31	4	28	2	July 20, '14	19 35·3	A. G. Stuart.
71·00 W.- " 31	4	28	2	" 20, '14	36·5	"
24·95 Bear 105·42' NE cor. sec. 24	7	28	2	Sept. 2, '14	31·5	C. Rinfret.
24·95 " " 24	7	28	2	" 3, '14	29·9	"
24·95 " " 24	7	28	2	" 3, '14	28·3	"
35·00 S.-NE cor. sec. 15	18	28	2	July 12, '14	43·5	B. H. Segre.
35·00 S.- " 15	18	28	2	" 13, '14	46·8	"
35·00 S.- " 15	18	28	2	" 13, '14	46·5	"
40·00 S.- " 21	41	28	2	Aug. 15, '14	21 34·8	R. Neelands.
Centre NE ¼ sec 14	42	28	2	" 5, '14	43·1	"
12·00 E.-NE cor. sec. 35	43	28	2	July 14, '14	20 53·1	"
12·00 N " 22	44	28	2	" 10, '14	23 50·3	"
Sta. 2 Traverse Shallow lake sec. 1	7	29	2	Sept. 3, '14	19 52·0	C. Rinfret.
" " " 1	7	29	2	" 4, '14	19 49·4	"
" " " 1	7	29	2	" 4, '14	52·4	"
5·00 N.-NE cor. sec. 34	17	29	2	Aug. 2, '14	47·1	B. H. Segre.
10·00 W.- " 36	19	29	2	July 22, '14	20 11·8	"
10·00 W. " 36	19	29	2	" 26, '14	17·7	"
10 00 W.- " 36	19	29	2	" 26, '14	14·9	"
48·20 bear. 133 51' N.E. cor. sec. 32	5	1	3	Sept. 28, '14	19 33·8	C. Rinfret.
48·20 " 133·51' " 32	5	1	3	" 28, '14	36·0	"
48·20 " 133·51' " 32	5	1	3	" 29, '14	29·6	"
Sta. 3 Twelve mile lake sec. 10	6	1	3	" 10, '14	44·5	"
55·60 S.-N.E. cor. sec. 10	14	1	3	July 18, '14	22 11·6	G. C. Cowper.
10·00 N.- \ 9·00 W.- / " 5	14	1	3	" 19, '14	10·1	"
9·00 W.- " 5	14	1	3	" 19, '14	09·9	"
18 00 N.- " 36	68	1	3	" 3, '13	23 33·3	A. Saint Cyr.
1·00 N.- " 13	69	1	3	" 13, '13	19·6	"
1·00 N.- " 13	69	1	3	" 13, '13	02·2	"
33·00 N.- " 36	69	1	3	" 30, '13	29·1	"
72·00 N.- " 13	70	1	3	Aug. 10, '13	33·2	"
18·00 N.- " 24	70	1	3	" 14, '13	22 22·9	"
18·00 N.- " 24	70	1	3	" 14, '13	23·9	"
62·00 N.- " 1	71	1	3	" 19, '13	46·3	"
58·00 N.- " 13	71	1	3	" 26, '13	23 39 5	"
48·00 N.- " 25	71	1	3	" 28, '13	22 2	"
48·00 N.- " 25	71	1	3	" 28, '13	14·8	"
40·60 N.- " 24	72	1	3	Sept. 3, '13	22 57·0	"
40·00 N.- " 24	72	1	3	" 5, '13	23 05·1	"

RESULTS OF MAGNETIC OBSERVATIONS, 1914-15.—*Continued.*

Table I.—Declination Observations.—Continued.

Place.	Township.	Range.	Meridian.	Date.	Declination.	Observer.
					° ′	
34·00 W.-NE. cor. sec. 34.	72	1	3	Sept. 13, '13	21 28·5	A. Saint Cyr.
34 00 W.- " 34.	72	1	3	" 14, '13	57·7	"
41·60 W.- " 32.	72	1	3	" 22, '13	22 22·0	"
41 60 W.- " 32.	72	1	3	" 23, '13	20 5	"
41·00 W.- " 32	72	1	3	" 24, '13	21 56·2	"
At " 36.	4	2	3	July 24, '14	19 36·1	A. G. Stuart.
At " 36.	4	2	3	" 21, '14	35·8	"
Sta. 37 Twelve mile lake sec. 22.	6	2	3	Sept. 16, '14	55·8	C. Rinfret.
" 37 " " 22.	6	2	3	" 16, '14	20 03 2	"
37 " " 22.	6	2	3	" 16, '14	19 55·4	"
24 00 W.-N.E. cor. sec. 36	72	2	3	" 30, '13	22 23·0	A. Saint Cyr.
44·00 W.- " 36.	72	2	3	" 30, '13	11·1	"
44 00 W.- " 36	72	2	3	Oct. 2, '13	24·0	"
65·00 W.- " 36.	72	2	3	" 4, '13	21 48·1	"
65 00 W.- " 36.	72	2	3	" 4, '13	45·7	"
40·00 W.- " 34.	72	2	3	" 10, '13	23 34·6	"
61 00 W.- " 34.	72	2	3	" 11, '13	24 24 4	"
61·00 W. " 33.	72	2	3	" 15, '13	37·3	"
75 00 W.- " 31	72	2	3	" 22, '13	22 46·8	"
20·30 bear. 109 11′ N.E. cor. sec. 36.	5	3	3	Sept. 27, '14	20 05·3	C. Rinfret.
20 30 " 109·11′ " " 36.	5	3	3	" 28, '14	04·7	"
Twelve mile lake sec. 27	6	3	3	" 22, '14	19 24·6	"
" "	6	3	3	" 23, '14	39·8	"
" "	6	3	3	" 23, '14	24·6	"
37 00 W.-N.E. cor. sec. 12.	14	3	3	July 30, '14	20 52·1	R. C. Purser.
At " 18.	22	3	3	Sept. 30, '14	49·4	B. H. Segre.
At " 18.	22	3	3	Oct. 5, '14	56·1	"
At " 18	22	3	3	" 5, '14	55 5	"
11·00 W.- " 31.	72	3	3	Nov. 4, '13	23 56·7	A. Saint Cyr.
30 00 W.- " 31	72	3	3	" 5, '13	03·8	"
30·00 W.- " 34	72	3	3	" 10, '13	29 4	"
20·00 W.- " 31.	72	3	3	" 14, '13	32·8	"
70·00 W.- " 31.	72	3	3	" 15, '13	24 59·4	"
At " 35	4	4	3	July 27, '14	18 56·2	A. G. Stuart.
At " 35	4	4	3	" 27, '14	53·0	"
5 00 E.- " 7.	19	4	3	Sept. 22, '14	21 09·4	B. H. Segre.
20·00 S.- " 19	20	4	3	Aug. 15, '14	18·4	"
20 00 S.- " 19.	20	4	3	" 15, '14	21 14·7	"
At " 19.	20	4	3	Sept. 23, '14	06·1	"
8·00 W.- " 36.	72	4	3	Nov. 15, '13	23 25·5	A. Saint Cyr.
14·00 W.- " 34	72	4	3	" 19, '13	48·9	"
33 00 W.- " 33.	72	4	3	" 21, '13	24 28·2	"
80 00 W.- " 33	72	4	3	" 21, '13	27·4	"
40·00 W.- " 31	72	4	3	" 25, '13	05·3	"
40·00 W.- " 35.	72	5	3	" 28, '13	25 35 9	"
10 00 W.- " 34.	72	5	3	" 29, '13	22·4	"
10·00 W.- " 34	72	5	3	" 29, '13	24 22 1	"
25·00 W.- " 33	72	5	3	Dec. 2, '13	56·1	"
25·00 W.- " 33.	72	5	3	" 2, '13	25·5	"
51·00 W.- " 33.	72	5	3	" 4, '13	35·8	"
71 00 W.- " 32	72	5	3	" 4, '13	18·1	"
46·00 W.- " 31.	4	6	3	Aug. 1, '14	21 20 2	A. G. Stuart.
52·00 W.- " 34.	72	6	3	Dec. 12, '13	24 15·9	A. Saint Cyr.
12 00 W.- " 33	72	6	3	" 13, '13	25 31·5	"
38 00 W.- " 33	72	6	3	" 13, '13	24 05·2	"
60 00 W.- " 33	72	6	3	" 15, '13	25 47·8	"
25·00 W.- " 32.	72	6	3	" 15, '13	24 42·6	"
*Sta. 4 S. Sask. R	22	7	3	Sept. 6, '14	21 47 1	B. H. Segre.
" 4 "	22	7	3	" 6, '14	40·3	"
15·00 N.-NE. cor. sec. 3.	53	7	3	Oct. 13, '14	23 09·3	R. Neelands.
36·00 W.- " 36	72	7	3	Dec. 19, '13	25 49·9	A. Saint Cyr.
1·00 W.- " 35	72	7	3	" 19, '13	24 58·3	"
39 60 W.- " 35.	72	7	3	" 20, '13	26 09·2	"
12 00 W.- " 34.	72	7	3	" 20, '13	15 1	"

RESULTS OF MAGNETIC OBSERVATIONS, 1914-15.—*Continued.*

Table I.—Declination Observations.—Continued.

Place.	Township.	Range.	Meridian.	Date.	Declination.	Observer.
					° ′	
52·00 W.-NE. cor. sec. 34	72	7	3	Dec. 23, '13	18·5	A. Saint Cyr.
81·00 W.- " 34	72	7	3	" 23, '13	11·0	"
81·00 W.- " 34	72	7	3	" 26, '13	25 33·0	"
27·50 W.- " 33	72	7	3	" 26, '13	26 07·9	"
At " 32	72	7	3	" 27, '13	27 39·7	"
39·00 W.- " 32	72	7	3	" 27, '13	07·2	"
9·00 W.- " 31	72	7	3	" 29, '13	26 35·4	"
9 00 W.- " 31	72	7	3	" 29, '13	27·5	"
10 00 W.- " 8	13	8	3	Sept. 24, '14	21 40 0	G. C. Cowper.
32·00 S.- " 18	14	8	3	" 21, '14	20 02·1	"
5·00 N.- " 18	24	8	3	" 28, '14	21 29·1	S. L. Evans.
10·00 N.- " 8	26	8	3	Oct. 8, '14	21 34·6	"
15·00 S.- " 16	26	8	3	" 16, '14	23·8	"
28 00 W.- " 34	72	8	3	Jan. 5, '14	25 44 3	A. Saint Cyr.
28·00 W.- " 33	72	8	3	" 6, '14	26 09 2	"
68·00 W.- " 33	72	8	3	" 6, '14	29·0	"
74·00 W.- " 31	72	8	3	" 16, '14	25 47·0	"
50·00 W.- " 34	4	9	3	Aug. 3, '14	20 52·7	A. G. Stuart.
50·00 W.- " 34	4	9	3	" 3, '14	21 25·7	"
At " 34	12	9	3	Sept. 22, '14	12·1	G. C. Cowper.
20.00 N.- " 9	21	9	3	Aug. 14, '14	56·6	R. C. Purser.
0·50 S.- " 26	24	9	3	Sept. 26, '14	43·5	S. L. Evans.
36·00 S.- " 25	21	9	3	" 28, '14	29·6	"
11·00 W.- " 36	72	9	3	Jan. 16, '14	25 59 0	A. Saint Cyr.
43·00 W.- " 36	72	9	3	" 17, '14	53·3	"
72·00 W.- " 36	72	9	3	" 17, '14	26 01·2	"
40 00 S.- " 29	13	10	3	Sept. 19, '14	21 04 9	G. C. Cowper.
7·00 N.- " 18	26	10	3	Oct. 13, '14	39·8	S. L. Evans.
0·50 N.- " 14	26	10	3	" 14, '14	22 02 5	"
1·00 S.- " 11	26	10	3	" 14, '14	00·3	"
At " 36	72	10	3	Jan. 27, '14	26 58 4	A. Saint Cyr.
At " 36	72	10	3	" 27, '14	27 03·1	"
0·50 E.- " 24	26	11	3	Oct. 12, '14	21 46·2	S. L. Evans.
54·00 W.- " 31	72	11	3	Feb. 11, '14	27 21·5	A. Saint Cyr.
9·00 W.- " 33	72	11	3	" 12, '14	57·4	"
79·00 W.- " 33	72	11	3	" 12, '14	21 4	"
31·00 N.- 31·00 E.- " 35	11	12	3	Sept. 6, '14	21 07 6	G. C. Cowper.
75 68 N.- " 23	39	12	3	" 18, '14	23 50 6	R. C. Purser.
At " 23	39	12	3	" 19, '14	48·7	"
At " 26	39	12	3	" 19, '14	45·0	"
80 00 W.- " 36	72	12	3	Feb. 17, '14	26 16·1	A. Saint Cyr.
49·00 W.- " 35	72	12	3	" 18, '14	25 29·5	"
13 00 W.- " 34	72	12	3	" 19, '14	23·8	"
11·00 W.- " 31	72	12	3	" 25, '14	26 26·6	"
At " 13	13	13	3	Sept. 17, '14	21 19·0	G. C. Cowper.
30·00 S.- " 32	29	13	3	" 7, '14	22·5	R. C. Purser.
1-4 cor. E. by sec. 24	39	13	3	" 16, '14	24 04 5	"
1-4 " 1	39	13	3	" 23, '14	23 59 7	"
61·00 S.-NE. cor. sec. 21	39	13	3	May 22, '14	55 1	S. L. Evans.
36 00 S.- " 15	39	13	3	" 26, '14	44·7	"
0 50 E.-SE. " 2	39	13	3	June 16, '14	54·9	"
5·00 S.-NE. " 25	39	13	3	May 29, '14	57 5	"
56 00 S.- " 14	39	13	3	" 30, '14	24 00·0	"
77·00 S.- " 24	39	13	3	June 3, '14	23 58·5	"
20 00 S.- " 29	39	13	3	July 21, '14	24 02·8	"
49·50 S.- " 20	39	13	3	" 22, '14	05 0	"
12 00 W.- " 20	39	13	3	" 25, '14	04·8	"
3·00 W.- " 36	72	13	3	Feb. 26, '14	26 00·3	A. Saint Cyr.
70·00 W.- " 34	72	13	3	Mar. 3, '14	25 55 6	"
61·00 W.- " 32	72	13	3	" 4, '14	25 27·3	"
30 00 W.- " 23	74	13	3	" 9, '14	26 01·0	"
39 00 W.- " 32	4	14	3	Aug. 11, '14	20 01·7	A. G. Stuart.
1 00 N.- " 7	38	14	3	July 8, '14	23 45·9	E. P. Bowman.

RESULTS OF MAGNETIC OBSERVATIONS, 1914-15.—*Continued.*

Table I.—Declination Observations.—Continued.

Place.	Township.	Range.	Meridian.	Date.	Declination.	Observer.
					° ′	
40·00 S.-NE. cor. sec. 1	39	14	3	July 23, '14	23 54·0	E. P. Bowman.
0·04 W.- " 27	39	14	3	" 25, '14	24 13·0	"
At " 31	39	14	3	Aug. 5, '14	23 48·3	"
At " 31	39	14	3	" 15, '14	24 00·9	"
38·00 W.- " 36	72	14	3	Mar. 7, '14	26 29·5	A. Saint Cyr.
69·00 W.- " 35	72	14	3	" 9, '14	06·5	"
At " 32	72	14	3	" 10, '14	10·5	"
36·00 W.- " 31	4	15	3	Aug. 12, '14	20 09·8	A. G. Stuart.
36·00 W.- " 31	4	15	3	" 12, '14	08·7	"
31·00 N.- } " 35	11	15	3	Sept. 3, '14	21 13·8	G. C. Cowper.
31·00 E.- }						
4·50 E.- } " 15	14	15	3	" 9, '14	13·0	"
5·00 S.- }						
30 00 S.- " 26	19	15	3	Oct. 9, '14	59·7	R. C. Purser.
20 00 S. ¼ " E. by 35	19	15	3	" 12, '14	58·2	"
¼ E. by sec 31	24	15	3	Aug. 26, '14	22 11·4	"
40·00 W.-NE. cor. sec. 31	35	15	3	Oct. 14, '14	23 55·9	G. A. Bennett
At " 23	37	15	3	July 4, '14	43·6	E. P. Bowman.
40·00 S.- " 14	38	15	3	" 13, '14	24 08 1	"
At " 19	39	15	3	Aug. 26, '14	23 00·9	"
20·00 W.- " 24	71	15	3	Mar. 15, '14	24 24·8	A. Saint Cyr.
20·00 W.- " 24	71	15	3	" 18, '14	31·9	"
20·00 W.- " 24	71	15	3	" 26, '14	27·8	"
20·00 W.- " 24	71	15	3	" 27, '14	38 0	"
20·00 W.- " 24	71	15	3	" 27, '14	41·0	"
50·00 W.- " 36	72	15	3	" 13, '14	25 53·2	"
40·00 W.- " 34	72	15	3	" 14, '14	26 13 6	"
At " 32	72	15	3	" 17, '14	27 21·9	"
24·50 W.- " 31	72	15	3	" 18, '14	21·1	"
40·00 S.- " 34	37	16	3	June 22, '14	24 12·1	E. P. Bowman.
At " 36	37	16	3	July 1, '14	41·2	"
42 50 E.- " 7	40	16	3	Aug. 27, '14	25 20·3	"
At " 35	72	16	3	Mar. 20, '14	27 29·2	A. Saint Cyr.
40·00 W.- " 33	72	16	3	" 21, '14	22·7	"
1·00 N.- " 1	39	17	3	June 11, '14	24 34 5	E. P. Bowman.
2 00 N.- " 18	40	17	3	Sept. 3, '14	23 51·6	"
8·00 W.- " 36	72	17	3	" 24, '14	27 19·1	A. Saint Cyr.
40·00 W.- " 35	72	17	3	" 25, '14	26 51·6	"
18·00 W.- " 34	72	17	3	" 26, '14	27 10 4	"
40·00 W.- " 33	72	17	3	" 28, '14	12 1	"
30·00 W.- " 31	4	18	3	Aug. 15, '14	21 18·5	A. G. Stuart.
16·00 N.- } " 35	9	18	3	Aug. 29, '14	07·6	G. C. Cowper.
12·00 E.- }						
At " 36	12	18	3	Aug. 26, '14	29 7	"
30·00 N.- " 24	35	18	3	Oct. 1, '14	24 10 1	G. A Bennett.
12 00 N.- " 5	13	19	3	Aug. 16, '14	21 45 2	G. C. Cowper.
10·00 E.- " 35	13	19	3	" 25, '14	35·8	"
20·50 S.- } " 34	14	19	3	" 20, '14	22 17·3	"
23·00 E.- }						
11·50 S.- } " 3	23	19	3	Oct. 13, '14	31 0	"
31·00 W.- }						
49·00 S.- } " 9	23	19	3	" 17, '14	27 3	"
12·00 W.- }						
20·00 E.- " 8	8	20	3	Aug. 9, '14	21 34·4	"
55·00 S.- } " 32	9	20	3	" 10, '14	35·7	"
9·00 W.- }						
25·00 N.- " 25	31	20	3	" 31, '14	35·0	G. A. Bennett.
20·00 S.- " 22	31	20	3	Sept. 28, '14	22 49·6	"
¼ on E by sec. 32	36	20	3	Aug. 7, '14	22 40 5	R. C. Purser.
0·57 E.- NE. cor. sec. 33	47	20	3	Sept. 30, '14	25 33 9	"
5·00 N.- " 32	15	21	3	Aug. 26, '14	24 05·9	S. L. Evans
0·50 N.- " 9	16	21	3	" 24, '14	23 03·0	"
1·50 S.- " 12	16	21	3	" 25, '14	21 45 2	"
3·50 N.- " 11	16	21	3	" 25, '14	37·7	"

RESULTS OF MAGNETIC OBSERVATIONS, 1914-15.—*Continued.*

Table I.—Declination Observations.—Continued.

Place.	Township.	Range.	Meridian.	Date.	Declination.	Observer.
					° ′	
0·50 N.-NE. cor. sec. 10	16	21	3	Aug. 25, '14	28·6	S. L. Evans.
78·00 S.- " 6	16	21	3	" 26, '14	23 24·2	"
5·00 N.- " 12	16	21	3	" 27, '14	21 43·0	"
5·00 N.- " 11	16	21	3	" 27, '14	38·1	"
5·00 N.- " 10	16	21	3	" 27, '14	22 20·3	"
9·00 W.- " 10	16	21	3	" 27, '14	39·6	"
52·00 W.- " 9	16	21	3	" 27, '14	23 45·9	"
20·00 W.- " 31	35	21	3	Sept. 20, '14	35·4	G. A. Bennett.
At " 12	63	21	3	Jan. 27, '14	27 50·6	A. L. Cumming.
6·75 S.- " 5	31	22	3	Aug. 24, '14	24 09·9	G. A. Bennett.
*35·00 W.- " 26	31	22	3	" 27, '14	23 59·6	"
*35·00 W.- " 26	31	22	3	" 27, '14	57·0	"
*35·00 W.- " 26	31	22	3	" 27, '14	57·5	"
*35·00 W.- " 26	31	22	3	" 27, '14	58·5	"
*35·00 W.- " 26	31	22	3	" 27, '14	56·6	"
*35·00 W.- " 26	31	22	3	" 27, '14	56·2	"
*35·00 W.- " 26	31	22	3	" 27, '14	58·2	"
*35·00 W.- " 26	31	22	3	" 27, '14	57·5	"
*35·00 W.- " 26	31	22	3	" 27, '14	55·9	"
*35·00 W.- " 26	31	22	3	" 27, '14	59·5	"
*35·00 W.- " 26	31	22	3	" 17, '14	24 00·1	"
*35·00 W.- " 26	31	22	3	" 27, '14	22 57·5	"
*35·00 W.- " 26	31	22	3	" 27, '14	56·8	"
35·00 W.- " 26	31	22	3	" 27, '14	57·2	"
35·00 W.- " 26	31	22	3	" 27, '14	23 56·5	"
35·00 " 26	31	22	3	" 27, '14	57·5	"
35·00 " 26	31	22	3	" 27, '14	55·7	"
35·00 " 26	31	22	3	" 27, '14	53·3	"
35·00 " 26	31	22	3	" 27, '14	54·0	"
35·00 " 26	31	22	3	" 27, '14	55·0	"
35·00 " 26	31	22	3	" 27, '14	54·5	"
35·00 " 26	31	22	3	" 27, '14	54·3	"
35·00 " 26	31	22	3	" 27, '14	52·2	"
35·00 " 26	31	22	3	" 27, '14	54·1	"
35·00 " 33	32	22	3	" 26, '14	03·2	"
*30·00 S.- " 35	33	22	3	Sept. 5, '14	11·9	"
At " 14	35	22	3	" 17, '14	52·7	"
24·50 S.- " 19	36	22	3	" 15, '14	50·3	"
47·00 S.- " 8	52	22	3	Oct. 10, '14	24 52·8	E. P. Bowman.
1·00 W.-SE. " 5	23	23	3	Aug. 30, '14	20 59·4	S. L. Evans.
3·00 W.- " 3	23	23	3	Sept. 1, '14	21 02·1	"
5·00 S.- " 9	23	23	3	" 1, '14	20 56·6	"
27·00 N.- " 3	23	23	3	" 3, '14	21 02·8	"
*4·00 N.- " 25	23	23	3	" 5, '14	08·9	"
5·50 S.- " 19	23	23	3	" 21, '14	12·0	"
0·25 S.- " 20	23	23	3	" 21, '14	09·0	"
2·00 S,- " 21	23	23	3	" 21, '14	02·2	"
0·50 S.- " 23	23	23	3	" 21, '14	05·0	"
At NW. " 31	45	23	3	Aug. 29, '13	24 45·7	A. L. Cumming.
At " 31	45	23	3	" 29, '13	45·5	"
At " 31	45	23	3	" 29, '13	45·3	"
At NE. " 10	45	23	3	" 25, '13	49·1	"
22·00 S,- " 10	45	23	3	" 25, '13	50·3	"
22·00 " 10	45	23	3	" 25, '13	49·2	"
At " 8	45	23	3	" 18, '13	24 45·8	"
At " 8	45	23	3	" 18, '13	46·7	"
At " 8	45	23	3	" 18, '13	45·6	"
At " 19	48	23	3	Sept. 18, '13	38·9	"
18·00 S.- " 19	48	23	3	" 18, '13	40·1	"
At SE. " 4	48	23	3	" 10, '13	41·9	"
At SE. " 4	48	23	3	" 10, '13	41·8	"
At SE. " 4	48	23	3	" 10, '13	42·9	"
5·00 S.- " 3	51	23	3	Oct. 23, '14	41·7	J. M Coté.
At " 22	52	23	3	" 1, '14	46·4	E. P. Bowman.

RESULTS OF MAGNETIC OBSERVATIONS, 1914-15.—*Continued.*

Table I.—Declination Observations.—Continued.

Place.	Township.	Range.	Meridian.	Date.	Declination.	Observer.
					° ′	
41·00 E.-NE. cor. sec. 8	52	23	3	Oct. 7, '14	45·8	E. P. Bowman.
At " 19	28	21	3	June 27, '14	22 45·2	G. A. Bennett.
30·00 N.- " 19	28	23	3	July 1, '14	51·3	"
1·00 N.- " 30	29	24	3	Aug. 12, '14	24 28·8	"
30·00 S.- " 17	51	24	3	Sept 25, '14	17·4	J. M. Coté.
14·00 S.- " 5	51	24	3	" 26, '14	27·2	"
8·00 S.- " 18	51	24	3	" 28, '14	25·8	"
25·00 E.-SE " 2	51	24	3	Oct. 6, '14	42·3	"
30·00 E.- " 8	51	24	3	" 7, '14	40·2	"
20·00 N.- " 1	51	24	3	" 7, '14	37 1	"
5·00 N.-NE " 9	51	24	3	" 28, '14	25·6	"
40·00 W.- " 33	51	24	3	Nov. 3, '14	33·5	"
20·00 N.- " 22	51	24	3	" 10, '14	28·5	"
60·66 S.- " 14	52	24	3	Sept. 20, '14	36 6	E. P. Bowman.
0·50 E.- "						
*6·72 W.- " 31	4	25	3	Aug. 25, '14	21 56·9	A. G. Stuart.
*6·72 W.- " 31	4	25	3	" 25, '14	58 1	"
8·00 N.-NE " 10	11	25	3	July 29, '14	22 59·4	G. C. Cowper.
40·00 N.- " 17	11	25	3	" 31, '14	23 02 4	"
At N.- " 9	17	25	3	June 29, '14	22 19·7	"
4·00 E.- " 34	29	25	3	Aug. 10, '14	56·5	G. A. Bennett.
At E.- " 34	30	25	3	" 11, '14	23 04·4	"
40·00 N.- " 13	30	25	3	" 13, '14	22 36 4	"
45·00 N.- " 7	28	26	3	July 7, '14	53 8	
At N.- " 26	29	26	3	Aug. 1, '14	23 55·4	"
26·00 S.- " 18	30	26	3	" 5, '14	24 29·3	"
43·32 W.- " 31	4	27	3	" 27, '14	22 04 1	A. G. Stuart.
43·32 W.- " 31	4	27	3	" 27, '14	03·9	"
43 32 W.- " 31	4	27	3	" 27, '14	02·7	"
At W.- " 15	17	27	3	June 30, '14	45·7	G. C. Cowper.
At W.- " 15	17	27	3	July 1, '14	44 6	"
44·00 S.- " 25	29	27	3	Aug. 5, '14	24 38·5	G. A. Bennett.
31·00 N.- " 24	30	27	3	" 4, '14	22·4	
At N.- " 16	13	28	3	June 14, '14	22 18 2	G. C. Cowper.
45·00 W.- " 16	13	28	3	" 16, '14	21·2	"
37·00 S.- "						
5·00 S.- " 25	15	28	3	" 26, '14	12·5	"
At S.- " 9	17	28	3	July 2, '14	40·4	"
10·25 SW. of Wit. I. P. T. 11, N.-NE cor. sec. 22	27	28	3	" 10, '14	23 51·9	G. A. Bennett.
50·00 S.- NE cor sec. 31	28	28	3	" 21, '14	24 16 4	"
At S.- " 7	30	28	3	" 25, '14	23 19·9	"
28 50 W.- " 21	13	29	3	" 11, '14	22 43·3	G. C. Cowper.
21 00 S.- "						
50·00 S.- " 29	15	29	3	" 7, '14	23 07·8	"
35·00 S.- " 21	17	29	3	" 4, '14	03·2	"
50·00 S.- " 27	29	29	3	" 22, '14	51·0	G. A. Bennett.
50 00 S.- " 27	29	29	3	" 30, '14	24 08·8	"
10·00 S.- " 1	7	1	4	Sept. 6, '14	21 51·0	A. G. Stuart.
10 00 S. " 1	7	1	4	" 6, '14	50·7	"
10 06 S.- " 1	7	1	4	" 6, '14	49 0	"
At " 34	12	1	4	Dec. 10, '14	54 1	M. H. Baker.
5·00 S.- " 36	15	1	4	Oct. 14, '14	23 47·3	A. G. Stuart.
5 00 S.- " 36	15	1	4	" 14, '14	46·3	"
15·00 S.- " 36	16	1	4	Nov. 15, '14	24·2	"
At " 5	16	1	4	Oct. 30, 14	15·1	M. H. Baker.
20 00 N.- " 28	16	1	4	" 31, '14	17·0	"
10·00 N.- " 13	19	1	4	" 18, '14	29 02 2	A. G. Stuart.
10·00 N.- " 13	19	1	4	" 18, '14	28 47·4	"
10·00 N.- " 13	19	1	4	" 18, '14	29 01·1	"
10·00 N.- " 13	19	1	4	" 18, '14	01 0	"
10·00 N.- " 13	19	1	4	" 18, '14	28 54·5	"
2·00 S. " 36	22	1	4	" 25, '14	31 31·0	"
2·00 S.- " 36	22	1	4	" 25, '14	31·3	"

RESULTS OF MAGNETIC OBSERVATIONS, 1914-15.—*Continued.*

Table I.—Declination Observations.—Continued.

Place.	Township.	Range.	Meridian.	Date.	Declination.	Observer.
					° ′	
2·00 S.-NE. cor. sec. 36	22	1	4	Oct. 25, '14	28 8	A. G. Stuart.
11 84 S.- " 36	24	1	4	" 28, '14	35 29·7	"
11·84 S.- " 36	32	1	4	" 28, '14	22·6	"
11 84 S.- " 36	22	1	4	" 28, '14	22·0	"
40·00 S.- " 36	32	1	4	Nov. 8, '14	32 07·5	"
40·00 S.- " 36	32	1	4	" 8, '14	09·9	"
40·00 S.- " 36	32	1	4	" 8, '14	07·9	"
At " 34	80	1	4	May 7, '13	25 24·9	F. V. Seibert.
5·00 S.- " 25	20	2	4	April 30, '14	23 12·1	J. M. Coté.
5·00 W.- " 33	80	2	4	May 12, '13	25 50·0	F. V. Seibert.
At " 31	80	2	4	" 14, '13	13·7	"
At " 19	28	3	4	July 18, '14	23 30·8	G. A. Bennett.
20·00 E.- " 24	42	3	4	Aug. 24, '14	45 9	O. B. Roberts.
14·00 W.- " 36	80	3	4	May 15, '13	25 20 9	F. V. Seibert.
50·00 W.- " 35	80	3	4	" 16, '13	19·1	"
45·00 W.- " 34	80	3	4	" 17, '13	14·6	"
10·00 E.- " 31	80	3	4	" 29, '13	25 13 0	"
40·00 N.- " 2	14	5	4	Oct. 14, '14	22 19·4	M. H. Baker.
2·00 N.- " 26	14	5	4	" 24, '14	05·8	"
40·00 W.- " 35	15	5	4	" 29, '14	25 31·4	"
23 00 E.- " 34	80	5	4	May 29, '13	27 10 7	F. V. Seibert.
5·00 S.- " 24	17	6	4	Nov. 24, '14	24 12·9	M. H. Baker.
40 00 S.- " 23	39	6	4	Aug. 27, '14	28 6	O. B. Roberts.
At " 8	42	6	4	" 20, '14	24 1	"
At " 21	4	7	4	July 11, '14	22 27 5	J. M. Cote.
40·00 S.- " 15	30	7	4	Sept. 4, '14	24 00 1	O. B. Roberts.
39·00 W.- " 31	80	7	4	June 13, '13	30 07·3	F. V. Seibert.
At Station 2, Sec. 7	43	8	4	Oct. 9, '14	25 42·0	G. W. Coltham.
20·00 S.-NE cor. sec. 23	29	9	4	Nov. 18, '14	23 39 2	M. H. Baker.
At " 22	35	9	4	Sept. 11, '14	24 07·6	O. B. Roberts.
40·00 S., " 18	39	9	4	June 29, '14	25 28 8	"
At " 7	40	9	4	" 25, '14	24·5	"
At ¼ cor. E. by sec. 31	41	9	4	" 10, '14	25 5	"
13·00 E.-NE cor. sec. 11	42	9	4	" 7, '14	38 0	"
At Station 4, sec. 7	43	9	4	Sept. 30, '14	25 8	G. W. Coltham.
At NE cor. sec. 16	45	9	4	Aug. 7, '14	25·0	"
At Station 4, sec. 26	46	9	4	" 1, '14	21 9	"
At Station 4, sec. 23	47	9	4	July 31, '14	30 5	"
15·00 S.-NE cor. sec. 5	22	10	4	June 18, '14	23 28·2	J. M. Coté.
15·00 N.- " 10	22	10	4	" 19, '14	32 9	"
At " 13	22	10	4	" 24, '14	35·6	"
At " 12	35	10	4	Sept. 12, '14	24 14·3	O. B. Roberts.
At " 7	39	10	4	July 2, '14	25 28 4	"
At " 17	40	10	4	" 13, '14	22·1	"
At " 6	41	10	4	" 14, '14	17·4	"
20·00 S.- " 36	42	10	4	June 2, '14	25·9	"
At " 7	42	10	4	July 23, '14	29·1	"
At Sta. 3, sec. 32	44	10	4	Aug. 17, '14	25 26·3	G. W. Coltham.
At Sta. 50, sec. 34	45	10	4	July 21, '14	02·1	"
1·00 W.-NE cor. sec. 33	46	10	4	Aug. 3, '14	06·0	"
At Sta. 5, sec. 33	47	10	4	July 7, '14	24 54 5	"
10 00 S.-NE cor. sec. 2	21	11	4	May 17, '14	23 26·1	J. M. Coté.
15·00 S.- " 7	21	11	4	" 20, '14	18·9	"
57·00 S.- " 3	21	11	4	" 9, '14	33·3	"
At " 11	39	11	4	July 4, '14	25 22·6	O. B. Roberts.
At " 21	40	11	4	" 9, '14	20·3	"
At " 23	40	11	4	" 10, '14	05·7	"
At " 27	41	11	4	" 21, '14	19·1	"
At " 33	41	11	4	" 25, '14	27·1	"
2 00 E.- " 11	42	11	4	" 27, '14	32·4	"
20 00 N.- " 12	43	11	4	Sept. 19, '14	32·4	G. W. Coltham.
At Sta. 3, sec. 2	43	11	4	" 25, '14	17·6	"
At Sta. 2, sec. 26	44	11	4	Aug. 17, '14	23·6	"
At Sta. 2, sec. 6	44	11	4	Sept 17, '14	30·9	"

RESULTS OF MAGNETIC OBSERVATIONS, 1914-15.—*Continued.*

Table I.—Declination Observations.—Continued.

Place.	Township.	Range.	Meridian.	Date.	Declination.	Observer.
					° ′	
At Sta. 3, sec. 1	45	11	4	Aug. 16, '14	12·1	G. W. Coltham.
50·00 S. NE cor. sec. 1	45	11	4	Aug. 17, '14	15·5	"
30·00 N.- " 7	46	11	4	July 17, '14	18·7	"
10·00 W.- " 33	47	11	4	June 15, '14	26 03·6	"
At " 33	47	11	4	" 29, '14	06·5	"
30·00 S.- " 16	47	11	4	July 3, '14	25 37·0	"
68·00 W.- " 34	80	11	4	" 3, '13	29 46·5	F. V. Seibert.
40·00 W.- " 20	9	12	4	Dec. 4, '14	22 06·4	M. H. Baker.
2·00 S.- " 1	22	12	4	May 28, '14	23 27·1	J. M. Cotè.
38·00 W.- " 34	22	12	4	May 30, '14	55·4	"
2·00 N.- " 8	22	12	4	June 5, '14	09·7	"
At " 16	39	12	4	July 4, '14	25 20·8	O. B. Roberts.
40·00 S.- " 17	40	12	4	" 7, '14	17·3	"
At " 20	41	12	4	" 21, '14	23·5	"
40·00 S.- " 24	41	12	4	" 22, '14	22·7	"
At " 17	42	12	4	" 24, '14	25 16·8	"
At Sta. 2, sec. 8	44	12	4	Sept. 19, '14	42·4	G. W. Coltham.
At Sta. 6, sec. 14	45	12	4	Aug. 26, '14	29·9	"
At NE. cor. sec. 17	60	12	4	Oct. 10, '14	26 33·4	H. M. R. Soars.
6·00 W.-NE. cor. sec. 31	92	12	4	July 31, '14	30 24·5	G. H. Blanchet.
At NE. cor. sec. 24	22	13	4	June 10, '14	23 31·1	J. M. Coté.
At " 25	40	13	4	Aug. 17, '14	25 28·1	O. B. Roberts.
At " 12	41	13	4	" 15, '14	20·7	"
At Sta. 4, Lake No. 1	44	13	4	Sept. 16, '14	28·0	G. W. Coltham.
At Sta. 2, sec. 24	45	13	4	Aug. 25, '14	46·3	"
5·00 N.- NE. cor. sec 24	46	13	4	" 30, '14	26 08·7	"
47·00 W - " 36	80	13	4	July 19, '13	30 44·5	F. V. Seibert.
42·00 W.- " 31	92	13	4	Aug. 6, '14	36·3	G. H. Blanchet.
1·04 W.- " 35	96	13	4	May 19, '14	55·4	"
11·20 W.- " 32	96	13	4	" 25, '14	31 45·3	"
At " 19	37	14	4	Sept. 21, '14	25 32 5	O B. Roberts.
At " 34	38	14	4	" 24, '14	30·4	"
At " 29	41	14	4	Aug. 12, '14	20 5	"
11·00 S.- " 3	41	14	4	Oct. 6, '14	37·6	M. H. Baker.
At " 35	42	14	4	Aug. 11, '14	27·0	O. B. Roberts.
*30·00 N - " 29	44	14	4	Sept. 5, '14	23·7	G. W. Coltham.
40·00 W.- " 34	46	14	4	" 1, '14	42 7	"
10·00 E.-SE. cor, sec. 3	47	14	4	Aug. 31, '14	40·9	"
38·00 W.-NE " 36	80	14	4	" 1, '13	29 24·4	F. V. Seibert.
7·00 W.- " 33	80	14	4	Aug. 5, '13	08·5	"
46·00 W.- " 31	92	14	4	" 17, '14	31 05·9	G. H. Blanchet.
At " 30	7	15	4	July 13, '14	23 07·6	W. J. Boulton.
40·00 W.- " 7	8	15	4	" 14, '14	23 23·3	"
40·00 W.- " 7	9	15	4	" 21, '14	52·6	"
40·00 N.- " 5	10	15	4	" 2, '14	22 44·4	"
At " 7	38	15	4	Sept 29, '14	25 24·3	O. B. Roberts.
At NE. cor. sec. 23	41	15	4	Aug. 5, '14	25 32·1	O. B. Roberts.
At " 4	42	15	4	" 4, '14	23·6	"
49·87 W.- " 35	96	15	4	June 4, '14	30 26·1	G. H. Blanchet.
63·75 W.- " 27	7	16	4	July 9, '14	23 07·6	W. J. Boulton.
63 75 W. " 27	7	16	4	" 12, '14	22 37·6	"
At " 31	8	16	4	Sept. 21, '14	23 44·9	"
At " 23	9	16	4	" 21, '14	28·3	"
40·00 S.- " 18	10	16	4	" 21, '14	20·3	"
43·00 N.- " 15	34	16	4	Oct. 28, '14	24 47 0	G. A. Bennett.
43·00 N.- " 15	34	16	4	" 28, '14	48·1	"
40·00 W.- " 10	34	16	4	" 29, '14	32·3	"
At " 12	38	16	4	" 1, '14	25 27·3	O. B. Roberts.
At " 32	41	16	4	July 29, '14	38·4	"
At " 35	42	16	4	" 31, '14	24·4	"
At " 36	80	16	4	Aug. 19, '13	30 03·9	F. V. Seibert.
12·00 W.- " 32	80	16	4	" 27, '13	08·1	"
40 38 W.- " 35	92	16	4	" 23, '14	36·9	G. H. Blanchet.
3·00 W.- " 31	95	16	4	June 11, '14	31 54·4	"

Table I.—Declination Observations.—Continued.

Place.	Township.	Range.	Meridian.	Date.	Declination.	Observer.
					° ′	
40·00 N.-NE. cor. sec. 26	7	17	4	July 14, '14	22 50·9	W. J. Boulton.
At SE. " 3	7	17	4	" 22, '14	23 00·4	"
27·47 W. 8. 74 S. NE cor. sec. 9	8	17	4	" 16, '14	01·5	"
27·47 W. 8. 74 S. " 9	8	17	4	" 17, '14	22 58·1	"
At " 19	9	17	4	Aug. 3, '14	23 13·4	"
13·11 W. 27·22 S.-NE. cor. sec. 8	10	17	4	" 29, '14	14·5	"
32·37 S. 5·57 W.- " 11	10	17	4	Sept. 11, '14	27·0	"
At NE. cor. sec. 5	11	17	4	" 23, '14	15·7	"
48·00 S.- " 3	12	17	4	" 23, '14	49·7	"
3·00 N.- " 19	34	17	4	Oct. 30, '14	24 21·9	G. A. Bennett.
3·00 N.- " 5	37	17	4	Nov. 7, '14	47·5	"
At " 2	38	17	4	Oct. 5, '14	25 34·1	O. B. Roberts.
At " 10	39	17	4	" 7, '14	25 32 3	"
At " 23	42	17	4	Aug. 1, '14	19·3	"
At Sta. 83, Beaver Hills, traverse NE. 28	51	17	4	Oct. 7, '14	26 32·4	H. M. R. Soars.
At Sta. 47, " Lake, sec. 7	53	17	4	Sept. 19, '14	24·1	"
Cor. of Lots 1, 2, 13 and 14, Block 2	78	17	4	Aug. 28, '14	28 31·1	S. D. Fawcett.
" " 1, 2, 13 and 14, " 2	78	17	4	" 29, '14	40·7	"
70·00 W.-NE. cor. sec. 32	80	17	4	Sept. 5, '13	30 24·2	F. V. Seibert
20·00 W.- " 36	92	17	4	Aug. 26, '14	31 04·2	G. H. Blanchet.
24·00 W.- " 36	96	17	4	June 12, '14	21·1	"
28·00 E.- " 31	8	18	4	" 27, '14	23 14·6	W. J. Boulton.
At " 9	9	18	4	Aug 3, '14	09 0	"
35·10 N. 26·62 E.-NE. cor. SE. ¼, sec. 22	10	18	4	Sept, 3, '14	19·2	"
63·80 E. 24·60 N.- " " " 22	10	18	44	" 4, '14	14·7	"
63·80 E. 24·60 N.- " " " 22	10	18	4	" 4, '14	13 1	"
63·80 E. 24·60 N.- " " " 22	10	18	4	" 4, '14	08·5	"
63·80 E. 24·60 N.- " " " 22	10	18	4	" 4, '14	07·9	"
63·80 E. 24·60 N.- " " " 22	10	18	4	" 4, '14	06·5	"
63·80 E. 24·60 N.- " " " 22	10	18	4	" 4, '14	05·7	"
63·80 E. 24·60 N.- " " " 22	10	18	4	" 4. '14	06·3	"
63·80 E. 24·60 N.- " " " 22	10	18	4	" 4, '14	06·9	"
40·00 S.-NE. cor. sec. 8	11	18	4	Aug. 31, '14	32·4	"
32·00 N.- " 24	34	18	4	Oct. 30, '14	24 22·0	G. A. Bennett.
At Sta. 14, Beaver Lake sec. 32	51	18	4	Sept. 2, '14	26 22·0	H. M. R. Soars.
At Sta. 8, " " 19	51	18	4	" 4, '14	19·4	"
At Sta. 20, " " 52	52	18	4	" 3, '14	18·3	"
19·00 E. ¼ on E. by. sec. 28	52	18	4	" 16, '14	32·2	"
40·00 W. ¼ " " 35	53	18	4	" 26, '14	30·6	"
33·23 W.-NE. cor. sec. 31	96	18	4	June 20, '14	30 21·9	G. H. Blanchet.
78·43 W.-58·00 N.-NE. cor. sec. 12	9	19	4	July 29, '14	23 10 4	W. J. Boulton.
33·00 W.-NE. cor. sec. 22	9	19	4	Aug. 1, '14	08·6	"
At NE. " 20	9	19	4	" 1, '14	12·0	"
78·43 W. 58·00 N.-NE. cor sec. 12	9	19	4	" 4, '14	11·5	"
78·43 W. 58·00 " 12	9	19	4	" 4, '14	12·7	"
78·43 W. 58·00 " 12	9	19	4	" 4, '14	11·1	"
78·43 W. 58·00 " 12	9	19	4	" 4, '14	11·5	"
78·43 W. 58·00 " 12	9	19	4	" 4, '14	10·7	"
78·43 W. 58·00 " 12	9	19	4	" 4, '14	13·3	"
78·43 W. 58·00 " 12	9	19	4	" 4, '14	14·7	"
78·43 W. 58·00 " 12	9	19	4	" 4, '14	14·5	"
78·43 W. 58 00 " 12	9	19	4	" 4, '14	15·5	"
78·43 W. 58·00 " 12	9	19	4	" 4, '14	16·9	"
78·43 W. 58·00 " 12	9	19	4	" 4, '14	13·1	"
78·43 W. 58·00 " 12	9	19	4	" 4, '14	12·1	"
78·43 W. 58·00 " 12	9	19	4	" 4, '14	10·1	"
40·00 E.-NE. cor. sec. 34	35	19	4	Oct. 14, '14	25 19·0	O. B. Roberts.
14·00 S. " 13	38	19	4	Nov. 10, '14	22·8	G. A. Bennett.
40·00 S.- " 5	39	19	4	Oct. 10, '14	23·5	O. B. Roberts.
At Sta. 15, Dry Grass Lake, sec. 21	53	19	4	Sept. 23, '14	27 00·7	H. M. R. Soars.
At Sta. 8, Goose lake, sec. 7	53	19	4	" 23, '14	26 35·3	"
12·00 W.-NE. cor. sec. 10	54	19	4	Aug. 4, '14	27 10·9	J. M. Coté
20·00 S.- " 2	54	19	4	" 12, '14	26 44·0	"
25·00 S.- " 21	54	19	4	" 26, '14	27 01·4	"

RESULTS OF MAGNETIC OBSERVATIONS, 1914-15.—*Continued.*

Table I.—Declination Observations.—Continued.

Place.	Township.	Range.	Meridian.	Date.	Declination.	Observer.
					° ′	
4·00 E.-NE. cor. sec. 31	54	19	4	Aug. 29, '14	26 52·7	J. M. Coté.
*35·00 E.- " 21	54	19	4	Sept. 5, '14	27 05·4	"
30·00 E.-¼ post E. by sec. 30	57	19	4	Oct. 13, '14	26 38·6	H. M. R. Soars.
74·18 W.-NE. cor. sec. 36	80	19	4	Jan. 19, '14	30 31·1	F. V. Seibert.
67·06 W.- " 31	92	19	4	Sept. 10, '14	27 5	G. H. Blanchet.
40·00 W.- " 24	8	20	4	Aug. 13, '14	23 06·1	W. J. Boulton.
40·00 S.- " 25	9	20	4	" 15, '14	27 3	"
At Sta. 15, traverse Hastings lake, sec. 21	51	20	4	" 11, '14	26 26·4	H. M R. Soars.
At Sta. 48, traverse Hastings lake, sec. 21	51	20	4	" 19, '14	33·5	"
*At Sta 11, Wanisan lake, sec. 8	52	20	4	" 24, '14	27·0	"
29·00 E.-NW. cor. sec. 17	70	20	4	Oct. 31, '14	28 52·4	Wm. Christie.
50·00 N.-SE. cor. sec. 5	71	20	4	Sept. 17, '14	29 00·3	"
60·00 E.-NW " 32	71	20	4	" 22, '14	28 53·7	"
1·32 W.-NE " 31	80	20	4	Jan. 24, '14	29 14·6	F. V. Seibert.
7·26 W.- " 36	96	20	4	June 29, '14	30 47 0	G. H. Blanchet.
At ¼ post on N. by sec. 9	51	21	4	Aug. 4, '14	26 50 0	H M. R. Soars.
" 9	51	21	4	" 10, '14	39 4	"
" 9	51	21	4	" 10, '14	35·7	"
" 9	51	21	4	" 12, '14	45·6	"
* " 9	51	21	4	" 18, '14	28·5	"
" 9	51	21	4	" 18, '14	25·1	"
" 9	51	21	4	" 19, '14	52·3	"
At Sta. 13, Cooking lake traverse	52	21	4	July 13, '14	27 01·8	"
" "	52	21	4	" 9, '14	26 36·9	"
" "	52	21	4	" 15, '14	52·0	"
" "	52	21	4	" 21, '14	47 1	"
" "	52	21	4	" 22, '14	52·0	"
" "	52	21	4	" 20, '14	42·4	"
39·00 N.-SE. cor. sec. 25	70	21	4	Aug. 28, '14	28 46·8	Wm. Christie.
22·00 S.-NE " 30	70	21	4	Oct. 13, '14	29 09 7	"
55·00 S.- " 21	70	21	4	" 21, '14	09·3	"
30·00 S.- " 14	70	21	4	" 31, '14	28 38 9	"
30 00 E.-NW " 32	71	21	4	Aug. 10, '14	39·7	"
2·00 N.-NE " 27	71	21	4	" 15, '14	58 0	"
8·00 E.-SW " 4	71	21	4	" 19, '14	29 03 8	"
10·62 W.- " 36	92	21	4	Sept. 16, '14	30 19 5	G. H. Blanchet.
At " 23	51	22	4	July 30, '14	26 26 1	H. M. R. Soars.
30·00 E.- " 20	52	22	4	" 1, '14	29·5	"
65·00 N.- " 22	52	22	4	June 24, '14	49·2	"
At " 4	70	22	4	" 6, '14	28 42·8	Wm. Christie.
20·00 N.-SE. " 28	70	22	4	" 11, '14	44·4	"
30·00 S.-NE. " 32	71	22	4	July 3, '14	30·9	"
At " 22	71	22	4	July 8, '14	29 24·5	"
At " 6	72	22	4	Aug. 13, '14	28 38·5	"
72·44 W.- " 34	80	22	4	Jan. 31, '14	29 09·9	F. V. Seibert.
18 80 W.- " 35	96	22	4	Oct. 17, '14	30 37 6	G. H. Blanchet.
5 00 S.- " 14	40	23	4	Jan. 1, '14	25 38·2	J. B. Saint Cyr.
At SE. " 29	52	23	4	June 9, '14	26 45·1	H. M. R. Soars.
0 39 W.-NE. " 32	80	23	4	Feb. 9, '14	29 14·5	F. V. Seibert.
40·48 W.- " 32	84	23	4	Jan. 14, '14	49·3	G. H. Blanchet.
27·44 W.- " 34	92	23	4	Sept. 29, '14	30 18 5	"
60 35 W.- " 31	96	23	4	Oct. 23, '14	31 08 2	"
58·32 W.- " 35	80	24	4	Feb. 12, '14	28 41·4	F. V. Seibert.
32·43 W.- " 34	84	24	4	Jan. 19, '14	29 29·7	G. H. Blanchet.
51 31 W.- " 34	92	24	4	Oct. 1, '14	30 29·7	"
31 00 S.- " 15	37	25	4	Nov. 21, '14	25 32·2	G. A. Bennett.
39·00 S.- " 15	37	25	4	" 21, '14	38 6	"
5·00 W.- " 35	80	25	4	Feb. 18, '14	30 23·5	F. V. Seibert.
76·40 W.- " 32	80	25	4	" 21, '14	14·5	"
35·85 W.- " 31	84	25	4	Jan. 27, 14	50·4	G. H. Blanchet.
53 00 W.- " 35	80	26	4	Feb. 23, '14	29 58 5	F. V. Seibert.
20·00 N.- " 14	17	27	4	Aug. 19, '14	25 38·4	J. A. Calder.

RESULTS OF MAGNETIC OBSERVATIONS, 1914-15.—*Continued.*

Table I.—Declination Observations.—Continued.

Place.	Township.	Range.	Meridian.	Date.	Declination.	Observer.
					° ′	
5·00 N.-NE. cor. sec. 13	17	27	4	Aug. 21, '14	26 28·1	J. A. Calder.
36·00 W.- " 24	17	27	4	" 22, '14	25 14·3	"
40·25 S.- " 22	17	27	4	" 26, '14	24 48 2	"
At " 2	64	27	4	Dec. 21, '13	27 52·5	A. L. Cumming.
At " 2	64	27	4	" 21, '13	52·0	"
At " 2	64	27	4	" 21, '13	50 6	"
17·50 W.-SE. " 4	35	28	4	Nov. 16, '14	25 20·6	G. A. Bennett.
2 00 S.-NE. " 18	2	29	4	Oct. 2, '14	23 52·0	M. P. Bridgland.
16·42 E.- " 35	34	29	4	Nov. 17, '14	25 29·6	G. A. Bennett.
At " 32	3	36	4	Aug. 29, '14	24 28·2	M. P. Bridgland.
¼ sec. cor. N. By. sec. 10	3	30	4	Sept. 13, '14	10·6	"
At NE. cor. sec. 20	3	30	4	" 13, '14	02·3	"
Traverse St. J. to F	Wabiskaw Settlement.		4	Aug. 13, '13	29 34 3	G. J. Lonergan.
Cor. marked XLII, XXVIII, XXIX.	Fort Smith, N.W.T.		4	July 31, '14	31 48·2	S. D. Fawcett.
SW. cor. bet. Lots 45 & 46	Smith Landing, Alta.		4	Aug. 3, '14	54·1	"
6·41 S. of cor. between lots 51 & 52 on base line	Resolution, N.W.T.		4	July 22, '14	33 34·4	"
6·41 " "	"		4	" 22, '14	28 6	"
40·00 S.-NE. cor. sec. 21	1	1	5	Nov. 5, '13	21 36·7	W. J. Boulton.
9·25 S.- " 20	4	1	5	" 7, '13	38·7	"
At " 23	4	1	5	" 8, '13	41·9	"
At " 21	4	1	5	Aug. 4, '14	46·8	M. P. Bridgland.
At ¼ sec. cor. E. by sec. 28	4	1	5	" 4, '14	53·6	"
At NE. cor. sec. 24	4	1	5	" 21, '14	42 4	"
30·00 S.- " 11	38	1	5	July 24, '14	26 04·5	J. M. Coté.
17·30 E.- " 32	104	1	5	Aug. 20, '14	32 09·6	J. A. Fletcher.
1·00 W.- " 36	104	1	5	" 22, '14	31 58·6	"
At " 32	8	2	5	Sept. 8, '13	24 30·6	W. J. Boulton.
40 00 W.- " 11	11	2	5	Dec. 8, '13	22·8	"
At " 8	14	2	5	Jan. 3, '14	22 33·5	"
At " 5	14	2	5	" 7, '14	23 40·5	"
At " 19	15	2	5	Aug. 5, '13	40 3	"
58·81 E.- " 36	100	2	5	Oct. 29, '14	31 14·3	J. A. Fletcher.
3 00 E.- " 34	104	2	5	Aug. 14, '14	32 02·4	"
67·44 E.- " 36	104	2	5	" 18, '14	31 43 5	"
52·40 W.- " 31	112	2	5	May 22, '14	30 56 9	J. R. Akins.
At ¼ sec. cor. middle N. by sec. 9	6	3	5	July 2, '14	24 55·1	M. Bridgland.
At ¼ sec cor. Middle N. by sec. 9	6	3	5	July 2, '14	24 54·6	M. P. Bridgland.
0·10 S.-NE cor. sec. 15	6	3	5	" 2, '14	50·5	"
7·74 S.-31·59 W.-NE. cor. sec. 20	8	3	5	Oct. 22, '13	05·8	W. J. Boulton.
40·00 W.-NE. cor. sec. 23	13	3	5	Dec. 18, '13	23 45·4	"
At " 26	14	3	5	Aug. 27, '13	44·5	"
22 30 W.- " 33	15	3	5	June 3, '13	24 15·0	"
At SE. cor. sec. 1	15	3	5	Aug. 14, '13	23 49·8	"
15·00 E.- NE. cor. sec. 36	100	3	5	Oct. 21, '14	31 08·7	J. A. Fletcher.
23 28 E.- " 34	104	3	5	Aug. 8, '14	30 33·5	"
27·00 W.- " 36	112	3	5	May 23, '14	31 01·6	J. R. Akins.
12·34 W.- " 35	112	3	5	" 25, '14	30 01·5	"
At " 35	7	4	5	Oct. 7, '13	24 12·4	W. J. Boulton.
At NE. cor. T. A. McLean's Coal Lease No. 3	19	4	5	Aug. 31, '14	25 02·9	M. H. Baker.
74·16 E.-NE. cor. sec. 33	100	4	5	Oct. 14, '14	32 15·7	J. A. Fletcher.
56·72 E.- " 36	104	4	5	Aug. 5, '14	31 35·1	"
1·00 W.- " 35	112	4	5	May 29, '14	32 13·1	J. R. Akins.
56·00 W.- " 35	112	4	5	" 30, '14	49·7	"
62·00 W.- " 35	112	4	5	" 31, '14	57 9	"
62·00 W.- " 35	112	4	5	" 31, '14	57·6	"
54·00 W.- " 35	112	4	5	" 31, '14	49·4	"
54·00 W.- " 35	112	4	5	" 31, '14	50 0	"
54·00 W.- " 35	112	4	5	" 31, '14	29·4	

RESULTS OF MAGNETIC OBSERVATIONS, 1914-15.—*Continued.*

Table I.—Declination Observations.—Continued.

Place.	Township.	Range.	Meridian.	Date.	Declination.	Observer.
					° ′	
54·00 W.-NE cor. sec. 35	112	4	5	May 31, '14	23·0	J. R. Akins.
54·00 W.- " 35	112	4	5	" 31, '14	42·0	"
54·00 W.- " 35	112	4	5	" 31, '14	48·4	"
54·00 W.- " 35	112	4	5	" 31, '14	37·8	"
54·00 W.- " 35	112	4	5	" 31, '14	27·8	"
54·00 W.- " 35	112	4	5	" 31, '14	53·4	"
54·00 W.- " 35	112	4	5	" 31, '14	02·4	"
6·00 W.- " 10	8	5	5	Sept. 15, '13	24 20·1	W. J. Boulton.
4·00 E.- " 15	8	5	5	" 24, '13	06·5	"
11·96 E.- " 31	100	5	5	Oct. 5, '14	30 43·6	J. A. Fletcher.
15·00 N.- " 32	76	6	5	Aug. 28, '13	28 53·6	G. J. Lonergan.
35·92 E.- " 36	100	6	5	Oct. 3, '14	30 16·5	J. A. Fletcher.
9·27 E.- " 36	104	6	5	July 27, '14	31 11·1	"
2·00 W.- " 34	112	6	5	June 13, '14	17·4	J. R. Akins.
44·67 W.- " 33	112	6	5	" 15, '11	32 29·5	"
20·00 S.- " 36	75	7	5	Sept. 5, '13	29 14·6	G. J. Lonergan.
At " 27	75	7	5	" 5, '13	35·0	"
30·18 E.- " 31	100	7	5	" 21, '14	31 52·3	J. A. Fletcher.
45·00 W.- " 36	112	7	5	June 13, '14	33 23·6	J. R. Akins.
78·73 W.- " 32	112	7	5	" 20, '14	34 47·8	"
5·00 W.- " 16	35	8	5	Sept. 19, '14	26 39·6	T. D. Green.
1·00 S.- " 2	36	8	5	June 20, '14	26·7	"
3·00 S.- " 12	36	8	5	July 8, '14	18·8	"
12·00 N.- " 21	36	8	5	" 16, '14	25·4	"
9·50 E.- ¼ cor. N. by sec. 36	75	8	5	Sept. 4, '13	29 46·5	G. J. Lonergan.
0 27 W.- NE. cor. sec. 34	104	8	5	July 8, '14	31 32·2	J. A. Fletcher.
36·90 E.- " 36	104	8	5	" 10, '14	33·2	"
4·00 N.- " 36	35	9	5	Sept. 1, '14	26 27·9	T. D. Green.
At " 25	73	9	5	Oct. 23, '13	29 41·2	G. J. Lonergan.
49·80 E.- " 34	100	9	5	Sept. 9, '14	34·5	J. A. Fletcher.
64·68 W.- " 34	112	9	5	June 29, '14	33 31·0	J. R. Akins.
10·00 S.- " 27	40	10	5	Oct. 22, '14	27 38·4	T. D. Green.
30·00 S.- " 4	40	10	5	Nov. 20, '14	29·6	"
20·00 E.- " 9	78	10	5	Sept. 18, '14	29 36·9	P. R. A. Belanger.
13·55 E.- " 33	100	10	5	June 13, '14	30 52·7	J. A. Fletcher.
64·40 W.- " 34	112	10	5	July 3, '14	36 11·3	J. R. Akins.
60·00 W.- " 32	112	10	5	" 4, '14	35·6	"
12·00 N.- " 5	26	11	5	" 20, '14	25 57·1	C. M. Walker.
5·00 N.- " 19	26	11	5	Oct. 10, '14	26 29·2	"
23·00 N.- " 36	39	11	5	Dec. 2, '14	27 20·5	T. D. Green.
10.00 N.- " 25	40	11	5	Nov. 7, '14	26·2	"
30·00 S.- " 16	72	11	5	Sept. 1, '14	29 10·9	P. R. A. Belanger.
17·18 N.- " 8	73	11	5	Aug. 31, '14	11·5	"
At " 11	75	11	5	Dec. 15, '14	28·7	"
12·00 N.- " 20	80	11	5	May 1, '14	26·4	"
38·00 S.- " 28	80	11	5	" 4, '14	58·1	"
20·00 S.- " 27	80	11	5	" 14, '14	30 06·5	"
39·70 E.- " 34	100	11	5	June 10, '14	30 29·0	J. A. Fletcher.
32·37 W.- " 36	112	11	5	July 7, '14	36 25·4	J. R. Akins.
17·00 W.- " 34	112	11	5	" 8, '14	21·6	"
55·52 W.- " 32	112	11	5	" 10, '14	35 47·5	"
68·75 W.- " 31	112	11	5	" 11, '14	45·3	"
20·00 N. ¼ cor. N. by sec. 23	25	12	5	" 24, '14	26 05·1	C. M. Walker.
At NE cor. sec. 12	26	12	5	Oct. 19, '14	08·3	"
2·00 S.- " 31	73	12	5	Sept. 10, '14	30 33·8	P. R. A. Belanger
1 60 N.- " 12	80	12	5	June 11, '14	29 46·4	"
30·90 E.- " 31	100	12	5	" 2, '14	31 11·1	J. A. Fletcher.
34·24 W.- " 35	112	12	5	July 13, '14	35 31·4	J. R. Akins.
At " 21	60	13	5	Oct. 26, '13	28 32·9	Jas. Gibbon
26·70 E.- " 31	100	13	5	May 28, '14	31 14·8	J. A. Fletcher.
32·31 E.- " 34	100	13	5	" 30, '14	41·0	"
27·03 E.- " 36	100	13	5	June 1, '14	36 2	"
0·55 W.- " 31	112	13	5	July 23, '14	35 06·9	J. R. Akins.
41·00 N.- " 25	77	14	5	Aug. 9, '14	29 54·3	P. R. A. Belanger.

Table I.—Declination Observations.—Continued.

Place.	Township.	Range.	Meridian.	Date.	Declination.	Observer.
					° ′	
28·98 W.- N. E cor. sec. 31	100	14	5	May 21, '14	32 02·5	J. A. Fletcher.
49·70 W.- " 33	112	14	5	July 26, '14	34 03·9	J. R. Akins.
" " 33	112	14	5	" 26, '14	33 58·6	"
" " 33	112	14	5	" 26, '14	34 02·1	"
" " 33	112	14	5	" 26, '14	33 59·6	"
" " 33	112	14	5	" 26, '14	57·2	"
" " 33	112	14	5	" 26, '14	56·8	"
" " 33	112	14	5	" 26, '14	55·0	"
" " 33	112	14	5	" 26, '14	49·4	"
" " 33	112	14	5	" 26, '14	33 46·3	"
" " 33	112	14	5	" 26, '14	51·6	"
" " 33	112	14	5	" 26, '14	59·2	"
60·00 S.- " 36	60	15	5	Sept. 22, '13	29 50·5	G. J. Lonergan.
3·00 N.- " 14	73	15	5	Aug. 26, '14	00·9	P. R. A. Belanger.
At " 33	78	15	5	" 17, '14	06 8	"
7·50 E.- " 1	100	15	5	May 16, '14	32 15·2	J. A. Fletcher.
50·10 E.- " 32	100	15	5	" 18, '14	28·5	"
32·00 W.- " 33	112	15	5	Aug. 1, '14	33 09·1	J. R. Akins.
" " 33	112	15	5	" 1, '14	19·8	"
" " 33	112	15	5	" 2, '14	22·2	"
31·00 W.- " 33	112	15	5	" 2, '14	13·7	"
2·00 E.- " 19	49	16	5	Oct. 26, '14	27 39·5	H. Matheson.
4·00 E.- " 32	100	16	5	May 11, '14	33 14·8	J. A. Fletcher.
65·42 W.- " 35	112	16	5	Aug. 4, '14	42·4	J. R. Akins.
53·92 W.- " 34	112	16	5	" 5, '14	49·6	"
6·00 N.- " 29	47	17	5	Sept. 2, '13	27 04·7	H. Matheson.
15·00 E.- " 19	47	17	5	" 9, '13	04·8	"
20·00 E.- " 19	48	17	5	Aug. 1, '13	28 12·4	"
8·00 S.- " 17	48	17	5	" 2, '13	27 27·9	"
20·00 S.- " 5	48	17	5	" 6, '13	14·6	"
41·00 S.- " 5	48	17	5	" 7, '13	25·3	"
3·40 E.- " 31	100	17	5	May 4, '14	32 23 9	J. A. Fletcher.
13·80 W.- " 34	100	17	5	" 6, '14	33 36·2	"
0·80 W.- " 36	100	17	5	" 8, '14	41·7	"
21·30 W.- " 33	112	17	5	Aug. 10, '14	37 10·4	J. R. Akins.
" " 33	112	17	5	" 10, '14	02·9	"
" " 33	112	17	5	" 10, '14	36 57·2	"
21 60 W.- " 32	112	17	5	" 11, '14	37 03·4	"
42·21 S.- " 20	23	18	5	Oct. 6, '14	25 58·2	N. C. Stewart.
At Sta. 629 Traverse, Columbia river, sec. 15	23	18	5	" 9, '14	57·9	"
At Station 7, Road from Field to Hector	28	18	5	July 16, '14	26 04·2	M. H. Baker.
At NE cor. Field Cemetery	28	18	5	" 25, '14	16·4	"
At Station 4, Survey of Lot for Geo. Lawes	28	18	5	Aug. 4, '11	05·8	"
At T. H. 74 Road from Field out Yoho Valley	29	18	5	June 29, '14	05·2	"
At T. H. 96, Road from Field out Yoho Valley	29	18	5	July 1, '14	20·7	"
At T. H. 143, Road from Field out Yoho Valley	29	18	5	" 9, '14	04·2	"
2·80 E.-NE cor. sec. 24	47	18	5	Aug. 29, '13	28 56·2	H. Matheson.
35 00 N.- " 24	48	18	5	" 15, '13	27 38·2	"
23 50 S.- " 1	48	18	5	" 19, '13	07·7	"
20·00 N.- " 10	77	18	5	Sept. 23, '14	29 11·1	P. R. A. Belanger.
27·55 W.- " 35	112	18	5	Aug. 14, '14	36 37·1	J. R. Akins.
26·90 W.- " 32	112	18	5	" 17, '14	07·5	"
46·11 W.- " 31	112	18	5	" 20, '14	35 55·3	"
60·60 E.- " 31	23	19	5	" 21, '14	25 52·9	N. C. Stewart.
60 00 E.- " 32	23	19	5	" 22, '14	52·3	"
8·00 E.- " 34	23	19	5	Sept. 1, '14	54·7	"
5·00 E.- " 34	23	19	5	" 1, '14	55·9	"
5·00 E.- " 34	23	19	5	" 2, '14	55·9	"
28·00 E.- " 33	23	19	5	" 2, '14	56·0	"

RESULTS OF MAGNETIC OBSERVATIONS, 1914-15.—*Continued.*

Table I.—Declination Observations.—Continued.

Place.	Township.	Range.	Meridian.	Date.	Declination.	Observer.
					° ′	
2·00 E.-NE cor. sec. 33	23	19	5	Sept. 2, '14	53·0	N. C. Stewart.
7·00 S.- " 35	23	19	5	" 4, '14	55·7	"
60·00 S.- " 35	23	19	5	" 4, '14	59·2	"
2·50 E.- " 26	23	19	5	" 4, '14	52·7	"
At " 35	23	19	5	" 8, '14	49·9	"
55·00 S.- " 36	23	19	5	" 10, '14	59·4	"
5·00 E.- " 25	23	19	5	" 12, '14	43·1	"
20·00 E.-SE¼ sec. 30	23	19	5	" 14, '14	56·3	"
At NE cor. sec. 36	23	19	5	" 23, '14	53·8	"
At T. H. 45 Road from Field, B.C. to Ottertail	27	19	5	June 22, '14	26 09·4	M. H. Baker.
50·00 N.-NE cor. sec. 27	73	19	5	Nov. 14, '14	29 24·5	P. R. A. Belanger.
At NE cor. sec. 23	74	19	5	" 11, '14	27·8	"
2·00 S.-NE cor. sec. 23	76	19	5	Oct. 3, '14	20·8	"
79·12 W. " 34	112	19	5	Aug. 22, '14	35 13·5	J. R. Akins.
2·25 W. " 31	112	19	5	" 25, '14	19·0	"
At " 36	23	20	5	" 19, '14	25 53·9	N. C. Stewart.
16·00 W.- " 36	23	20	5	" 20, '14	57·1	"
3·00 E.- " 33	24	20	5	July 4, '14	54·9	"
22·80 E.- " 31	24	20	5	" 7, '14	50·6	"
18·40 E.- " 32	24	20	5	" 8, '14	54·0	"
69·00 E.- " 32	24	20	5	" 9, '14	53·0	"
At " 28	24	20	5	" 13, '14	55·5	"
60·00 W.- " 28	24	20	5	" 14, '14	59·4	"
16·00 E.- " 28	24	20	5	" 15, '14	51·9	"
70·00 E.- " 28	24	20	5	" 16, '14	58·6	"
71·00 S.- " 27	24	20	5	" 17, '14	55·5	"
63·00 S.- " 28	24	20	5	" 18, '14	52·7	"
14·00 S.- " 7	25	20	5	June 30, '14	54·5	"
70·00 E.- " 6	25	20	5	July 2, '14	53·0	"
55·00 S.- " 6	25	20	5	" 6, '14	56·6	"
At Station 826 Traverse, Columbia R., sec. 8	25	20	5	Oct. 19, '14	59·4	"
47·00 N.-NE cor. sec. 3	78	20	5	" 1, '14	29 40·5	P. R. A. Belanger.
17·31 W.- " 31	112	29	5	Aug. 31, '14	34 22·2	J. R. Akins.
At " 22	25	21	5	June 8, '14	26 10·0	N. C. Stewart.
20·00 N.- " 14	25	21	5	" 12, '14	25 56·5	"
5·38 N.- " 13	25	21	5	" 15, '14	51·8	"
Course 12-13 Traverse, Columbia R., sec. 33	25	21	5	" 22, '14	49·5	"
55·00 N.-NE cor. sec. 30	26	21	5	May 11, '14	26 08·0	"
At " 6	26	21	5	June 2, '14	25 49·1	"
76·00 W. " 6	26	21	5	" 3, '14	55·6	"
At " 19	26	21	5	May 14, '14	26 01·2	"
32·00 N.-SE. cor. sec 7	26	21	5	June 4, '14	25 53·3	N. C. Stewart.
5·00 N.-NE " 21	26	21	5	" 5, '14	52·2	"
At T.H. 31 Traverse Columbia R. sec. 8	26	21	5	" 8, '14	53·5	"
32·00 N.-NE. cor. sec. 16	73	21	5	Nov. 19, '14	29 23·7	P. R. A. Belanger.
8·00 S.- " 7	79	21	5	Oct. 30, '14	25·6	"
22·00 E.- " 4	79	21	5	Nov. 2, '14	37·0	"
35·00 S.-NE. " 19	80	21	5	Oct. 28, '14	16·9	"
11·45 W.- " 33	112	21	5	Sept. 2, '14	33 57·2	J. R. Akins.
30·00 E.- " 26	26	22	5	May 18, '14	26 06·9	N. C. Stewart.
15·00 S.- " 25	26	22	5	" 23, '14	00·8	"
60·00 S.- " 23	26	22	5	" 25, '14	06·2	"
At T.H. 34, sec. 13	27	22	5	Apr. 27, '14	11·5	"
7·00 E.-NE. cor. sec. 11	27	22	5	" 29, '14	20·1	"
7·23 E.- " 22	27	22	5	May 7, '14	14·6	"
45·00 W.- " 31	78	22	5	Oct. 19, '14	29 27·9	P. R. A. Belanger.
25·00 N.- " 22	80	22	5	" 21, '14	29 19·0	"
34·00 W.- " 33	112	22	5	Sept 9, '14	33 09·5	J. R. Akins.
67·99 W.- " 32	112	22	5	" 11, '14	13·9	"
15·00 N.- " 22	73	23	5	Nov. 26, '14	29 21·5	P. R. A. Belanger.

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RESULTS OF MAGNETIC OBSERVATIONS, 1914-15.—*Continued.*

Table I.—Declination Observations.—Continued.

Place.	Township.	Range.	Meridian.	Date.	Declination.	Observer.
					° ′	
20·00 S.-NE. cor. sec. 22	78	23	5	Oct. 12, '14	40·5	P. R. A. Belanger.
43·00 N.- " 11	78	24	5	" 16, '14	57·3	"
58·69 W.- " 36	112	24	5	Sept. 16, '14	34 14·4	J. R. Akins.
20·00 N.- " 1	73	25	5	Nov. 29, '14	29 22·6	P. R. A. Belanger.
At " 20	49	26	5	Oct. 27, '14	27 47·1	H. Matheson.
22·50 S.-¼ post N. by. sec. 20	49	26	5	" 31, '14	35 5	"
20·00 W.- NE. cor. sec. 35	71	26	5	Dec. 3, '14	28 38·2	P. R. A. Belanger.
Centre of Lot 27, Lesser Slave Lake Settlement	....	...	5	June 26, '13	29 55·7	G. J. Lonergan.
Centre of Lot 20, on base line Lesser Slave Settlement	....	...	5	" 30, '13	30 11·5	"
Intersection of Base line with N. by. Lot 13, Hay River, N.W.T	....	....	5	" 22, '14	36 47·2	S. D. Fawcett.
" " " "	....	....	5	" 22, '14	32 0	"
At T.H. N. by Lot 25, Fort Providence, N.W.T	....	....	5	" 5, '14	37 45 0	"
At " " "	....	....	5	" 5, '14	29·8	"
11·00 N.-SE. cor. sec. 4	22	1	6	Oct. 3, '14	25 53·3	W. J. Johnston.
At NE. cor. SW.¼ sec. 31	23	1	6	" 17, '14	04·3	"
At " NE. cor. sec. 27	45	1	6	May 4, '14	27 25·1	H. Matheson.
47·00 S.- " 15	45	1	6	" 8, '14	30·0	"
30·00 E.- " 22	45	1	6	" 9, '14	21·2	"
10·00 N.- " 14	45	1	6	" 13, '14	36·5	"
10·00 N.- " 26	45	1	6	" 18, '14	18·0	"
10·00 W.- " 25	45	1	6	" 23, '14	25·1	"
2·00 N.- " 8	45	1	6	Nov. 23, '13	25·4	"
15·00 W.- " 22	45	1	6	Dec. 11, '13	26·5	"
40·00 N.- " 2	46	1	6	Oct. 12, '14	19·7	"
At " 8	45	2	6	Aug. 29, '14	17 1	"
60·00 N.-SE " 8	20	5	6	July 4, '14	26 19·2	W. J. Johnston.
50·00 W.-SE " 6	19	6	6	June 9, '14	04 2	"
10·00 E.-SW " 5	19	6	6	" 10, '14	05 4	"
At NE " 25	19	6	6	" 18, '14	12·2	"
At " 36	19	6	6	" 23, '14	06·8	"
40·00 W.- " 36	20	6	6	July 1, '14	12·5	"
5·00 W.-SE " 4	23	6	6	" 30, '14	15·6	"
At " 9	23	6	6	Aug. 4, '14	38·2	"
40·25 N.-SE " 17	23	6	6	" 7, '14	22·6	"
60·00 N.- " SW. ¼ sec. 23	23	6	6	" 13, '14	15·0	"
At " 22	23	6	6	" 14, '14	25 59·7	"
30.00 W.-NE. cor. NW.¼ sec. 15	22	7	6	" 26, '14	26 47·2	"
30·00 S.-NE. cor. sec. 8	21	12	6	July 21, '14	25 38·4	"
At " 23	22	12	6	Oct. 30, '14	26 23·2	"
At " 24	21	13	6	July 18, '14	40·2	"
At " 22	20	14	6	Apr. 27, '14	25 53·2	C. H. Taggart.
38·73 W.- " 14	23	17	6	May 5, '14	40·5	"
70·50 W.- " 13	23	17	6	" 5, '14	26 05·9	"
15·00 W.- " 16	23	17	6	" 18, '14	25 46·5	"
50·00 W.- " 16	23	17	6	" 19, '14	47·1	"
55·11 W.- " 17	23	17	6	" 21, '14	26 13·4	"
7·00 N.- " 18	23	17	6	" 22, '14	03·9	"
32·84 N.- " 18	23	17	6	" 26, '14	25 57 4	"
At " 19	23	17	6	" 28, '14	26 05·3	"
75·82 W.- " 19	23	17	6	" 29, '14	25 53·3	"
40·00 N.- " 25	82	17	6	Nov. 9, '13	31 26·3	L. Brenot.
7·00 N.- " 36	83	17	6	Aug. 22, '13	23·1	"
20·00 N.- " 12	83	17	6	" 24, '13	28·5	"
40·93 W.- " 24	23	18	6	May 30, '14	25 57·9	C. H. Taggart.
25·00 W.- " 23	23	18	6	June 1, '14	36·7	"
65·60 W.- " 23	23	18	6	" 2, '14	05·4	"
15·00 N.- " 21	23	18	6	" 5, '14	23 37·2	"
2·65 W.- " 28	23	18	6	" 8, '14	27 53·0	"
13·20 N.- ¼ cor. sec. 32	23	18	6	" 13, '14	25 35·2	"
At NE. cor. sec. 32	23	18	6	" 15, '14	26 06·1	"

RESULTS OF MAGNETIC OBSERVATIONS, 1914-15.—*Continued.*

Table I.—Declination Observations.—Continued.

Place.	Township.	Range.	Meridian.	Date.	Declination.	Observer.
					° ′	
69·77 W.-NE. cor. sec. 32	23	18	6	June 16, '14	27 16·6	C. H. Taggart.
69·77 W.- " 32	23	18	6	" 17, '14	19·8	"
33·25 W.- " 31	23	18	6	" 18, '14	24 05·9	"
At " 31	23	18	6	" 19, '14	46·4	"
65·00 N.- " 12	81	18	6	Sept. 28, '13	30 39 8	L. Brenot.
20·00 S.- " 26	82	18	6	" 10, '14	31 29·3	"
10·00 S.- " 26	82	18	6	" 27, '14	05·5	"
30·00 N.- " 12	83	18	6	Aug. 8, '13	12·1	"
60·00 E.-SE " 2	83	18	6	Sept. 26, '14	21·4	"
21·00 W.-NE " 1	24	19	6	June 20, '14	26 13·9	C. H. Taggart.
11·93 N.- ¼ cor. sec. 1	24	19	6	" 20, '14	26·3	"
23·00 W.-NE. cor. sec. 17	24	19	6	July 8, '14	27 07·4	"
19·00 W.- ¼ cor. N. by sec. 18	24	19	6	" 9, '14	25 43·7	"
15·00 W.-NE. cor. sec. 17	24	19	6	" 29, '14	26 34·3	"
25·00 N.- " 12	81	19	6	Sept. 10, '13	31 17·6	L. Brenot.
60·00 N.- " 25	81	19	6	" 20, '13	16·6	"
60·00 S.-NE " 30	22	20	6	Oct. 21, '14	27 02·7	J. A. Calder.
51·00 E.- " 6	23	20	6	" 17, '14	26 44·6	"
1·00 W.- " 5	23	20	6	" 19, '14	27 05·8	"
3·00 E. ¼ post sec. 13	24	20	6	July 10, '14	26 53·3	C. H. Taggart.
At ¼ post N. by sec. 15	24	20	6	" 26, '14	47 0	"
At " " 15	24	20	6	" 26, '14	47·2	"
At NE. cor. sec 14	24	20	6	" 29, '14	16·6	"
38 00 N.- " 21	83	20	6	" 30, '13	30 55·0	L. Brenot.
5·00 E.- " 36	22	21	6	Oct. 16, '14	27 00 6	J. A. Calder.
1·00 E.- " 24	22	21	6	" 22, '14	30 19·4	"
17·00 S. ¼ on N. by sec. 36	22	21	6	" 23, '14	28 47·7	"
1·00 E.-NE. cor. sec. 24	22	21	6	" 24, '14	30 24·8	"
13·35 W.- " 33	23	21	6	Aug. 13, '14	26 30·3	C. H. Taggart.
10·26 W.- ¼ post N. by sec. 32	23	21	6	" 15, '14	27 34·2	"
30·00 N.-NE. cor. sec. 32	23	21	6	" 17, '14	26 46·7	"
26·70 S. ¼ post E. by sec. 33	23	21	6	" 18, '14	22·7	"
26·70 " " 33	23	21	6	" 19, '14	30·9	"
At NE. cor. sec. 34	23	21	6	" 20, '14	47·5	"
22·50 N.- " 3	24	21	6	" 3, '14	47·4	"
19·74 W.- " 10	24	21	6	" 8, '14	48·5	"
21·46 W. ¼ N. by sec. 18	24	21	6	" 31, '14	05·1	"
43·00 N.-NE. cor. sec 3	84	21	6	July 25, '13	31 02·1	L. Brenot.
At ¼ post N. by sec. 14	24	22	6	Sept. 2, '14	26 15·1	C. H. Taggart.
6·00 N.-NE cor. sec. 22	24	22	6	" 2, '14	25 44 2	"
*4·00 E.- " 21	24	22	6	" 5, '14	51·8	"
37·80 W.- " 21	24	22	6	" 7, '14	23 18·6	"
6·00 W. ¼ N. by sec. 21	24	22	6	" 9, '14	26 30·6	"
40·10 W.- " 20	24	22	6	" 10, '14	34·8	"
19·00 W.- " 19	24	22	6	" 12, '14	24 57·4	"
40·00 E.-NE cor. sec. 19	83	22	6	July 20, '13	31 44·5	L. Brenot.
5·00 S.- ¼ N. by sec. 7	7	23	6	Oct. 6, '14	24 58·4	Jas. Gibbon.
At " 17	7	23	6	" 10, '14	25 22·0	"
At " 20	7	23	6	" 12, '14	23·8	"
At ¼ E. " 29	7	23	6	" 14, '14	14·1	"
At " " 28	7	23	6	" 15, '14	18·3	"
74·00 W.-NE. cor. sec. 22	13	23	6	" 6, '14	48·7	W. H. Norrish.
15·00 S.- " 29	13	23	6	" 7, '14	24 57·6	"
65·00 W.- " 21	13	23	6	" 7, '14	22 06·8	"
25·00 W.- " 22	14	23	6	Aug. 11, '14	28 35·7	"
46·94 W.- " 33	14	23	6	Sept. 1, '14	25 51·6	"
46·03 W.- " 32	14	23	6	" 3, '14	27·5	"
41·00 N.- " 4	14	23	6	Oct. 12, '14	28 48·7	"
9·00 W.- " 3	14	23	6	" 19, '14	23 22·8	"
At " 4	14	23	6	" 20, '14	30 23 7	"
77 00 S. " 10	15	23	6	Aug. 5, '14	24 44·4	"
9·76 S.- " 8	15	23	6	" 28, '14	25 00·6	"
*45 00 W.- " 5	15	23	6	Sept. 5, '14	24 23·8	"
71·44 N.-SE. " 6	15	23	6	" 21, '14	26 26·2	"

RESULTS OF MAGNETIC OBSERVATIONS, 1914-15.—*Continued.*

Table I.—Declination Observations.—Continued.

Place.	Township.	Range.	Meridian.	Date.	Declination	Observer.
					° ′	
45·00 N.- NE. cor. sec. 7	15	23	6	Sept. 24, '14	25 20·3	W. H. Norrish.
54·00 W.- SE. " 6	15	22	6	" 29, '14	24 31·6	"
8·00 W. NE.- " 22	24	23	6	" 15, '14	27 40·6	C. H. Taggart.
21·50 W.- " 21	24	23	6	" 17, '14	26 45·2	"
19·82 W.- ¼ post N. by sec. 20	24	23	6	" 19, '14	25 55·3	"
*At ¼ E by sec. 21	6	24	6	" 5, '14	04·3	Jas. Gibbon.
75·00 N. ¼ post N. by sec. 22	6	24	6	" 12, '14	11·6	"
38·00 N.- NE. cor. sec. 27	6	24	6	" 25, '14	02 1	"
At ¼ N. by sec. 35	6	24	6	" 29, '14	13·8	"
50·00 N.- SE. cor. sec. 1	15	24	6	" 30, '14	26 17·2	W. H. Norrish.
5·00 N.- " 4	16	24	6	Oct. 28, '14	29·4	"
25·17 N.- NE. cor sec. 4	16	24	6	" 29, '14	24·1	"
43 00 S.- " 8	18	24	6	Sept. 10, '14	07·3	J. A. Calder.
2·00 E.- " 9	18	24	6	" 12, '14	28 07·3	"
40·00 S.- " 4	18	24	6	" 15, '14	27 47·3	"
20·00 E.- " 16	18	24	6	" 19, '14	25 16·2	"
24·00 E.- " 15	18	24	6	" 22, '14	36·7	"
10·00 E.- NW. cor. L.S. 12, sec. 24	18	24	6	" 28, '14	57·7	"
24·00 S.- NE. cor. sec. 27	18	24	6	" 29, '14	49·6	"
15·00 N.- " 27	19	24	6	Oct. 3, '14	47·7	"
60·00 W.- " 22	19	24	6	" 5, '14	27 23·3	"
10·00 W.- " 15	19	24	6	" 6, '14	28 22·9	"
19·18 W.- 2·00 S.- ¼ N. by-sec. 34	19	24	6	" 8, '14	27 31·2	"
2·50 E.- NE. cor. sec. 4	20	24	6	" 10, '14	28 24 4	"
45·00 W.- " 9	24	24	6	Sept. 28, '14	15 0	C. H. Taggart.
45·00 W.- " 9	24	24	6	" 29, '14	11·9	"
5·00 N.- " 36	80	24	6	Apr. 4, '14	31 40·7	L. Brenot.
30·00 N.- " 25	80	24	6	" 3, '14	45·7	"
7·00 N.- " 24	81	24	6	" 8, '14	57·3	"
30 00 N.- " 1	82	24	6	" 19, '14	56·7	"
40·00 N.- " 1	84	24	6	July 23, '14	31 6	"
22·00 E.- " 7	5	25	6	May 13, '14	23 47 9	Jas. Gibbon.
20·00 N.- " 8	5	25	6	" 15, '14	24 51·7	"
64 70 N.- " 8	5	25	6	" 16, '14	53·8	"
16·62 S.- " 8	5	25	5	" 17, '14	28·4	"
16·62 S.- " 8	5	25	6	" 19, '14	25 08·0	"
25·00 N.- " 17	5	25	6	" 29, '14	24 51·6	"
7·00 E.- " 20	5	25	6	" 30, '14	25 11·0	"
31·35 N.- " 21	5	25	6	June 3, 14	31·5	"
55·00 N.- " 20	5	25	6	" 10, '14	26·9	"
18·83 E.- " 17	5	25	6	" 22, '14	22·1	"
21·35 E. " 20	5	25	6	" 22, '14	44·9	"
18·83 E.- " 17	5	25	6	" 23, '14	19·2	"
66·00 E.- " 17	5	25	6	" 23, '14	16·3	"
40·00 N.- " 16	5	25	6	" 25, '14	12 0	"
25·00 S.- " 16	5	25	6	" 27, '14	26·7	"
17·20 E.- ¼ cor. E. by-sec. 8	5	25	6	July 1, '14	24 18·4	"
8·00 W.- ¼ cor. E. by. sec. 17	5	25	6	" 2, '14	24 46·3	"
53·00 W.-NE. cor. sec. 28	5	25	6	" 6, '14	25 37·1	"
30·00 N.- " 28	5	25	6	" 13, '14	26 13 8	"
16·50 N.- " 34	5	25	6	" 18, '14	27 06·6	"
61·34 N.- ¼ cor. N. by sec. 35	5	25	6	" 28, '14	57·5	"
28·52 N.-NE. cor. sec. 11	3	25	6	Aug. 4, '14	24 48·6	"
27 36 N.- ¼ cor. N. by. sec. 13	6	25	6	" 13, '14	57·7	"
27·36 N.- ¼ " 13	6	25	6	" 13, '14	25 00·1	"
48·92 N.- ¼ " 13	6	25	6	" 16, '14	11·3	"
48·92 N.- ¼ " 13	6	25	6	" 16, '14	08·3	"
At NE. cor. sec. 24	6	25	6	" 17, '14	06·0	"
3·00 S. centre sec. 3	17	25	6	Apr. 28, '14	26 09·7	J. A. Calder.
1·93 N. 6·93 W.- ¼ cor. E. by. sec. 3	18	25	6	May 6, '14	19 5	"
16·00 N.-SE. cor. sec. 4	18	25	6	" 8, '14	25 21 0	"
6·00 N.- " 3	18	26	6	" 12, '14	49·3	"
40·00 W.-NE " 30	18	25	6	" 27, '14	26 47·9	"
29·90 S. 15·60 E.- centre of sec. 16	18	25	6	" 28, '14	34 6	"

RESULTS OF MAGNETIC OBSERVATIONS, 1914-15.—*Continued.*

Table I.—Declination Observations.—Continued.

Place.	Township.	Range.	Meridian.	Date.	Declination.	Observer.
					° ′	
28·55 S. 14·30 W.-NE. cor. sec. 20	18	25	6	May 29, '14	25 48·0	J. A. Caller.
41·70 E. 48·62 N.- " 30	18	25	6	" 30, '14	26 42·4	"
33·30 E. 8·50 S. " 8	18	25	6	June 3, '14	51·0	"
At NE. cor. sec. 31	18	25	6	" 10, '14	59·6	"
68·00 S. ¼ cor. N. by. sec. 16	18	25	6	" 12, '14	54·3	"
48·00 W.-NE. cor. sec. 23	18	25	6	" 23, '14	33·2	"
At NW. cor. lot 17, G. 1	18	25	6	" 27, '14	30·2	"
25·00 E.,SW. cor. lot 18, G. 1	18	25	6	" 26, '14	04·5	"
15·50 E.-NW. " 17, G. 1	18	25	6	" 28, '14	37·6	"
15·50 E.- " 17, G. 1	18	25	6	" 29, '14	36·8	"
15·50 E.- " 17, G. 1	18	25	6	July 4, '14	29·4	"
At NE. cor. sec. 34	23	25	6	Oct. 8, '14	04·9	C. H. Taggart.
12·00 W. " 34	23	25	6	" 9, '14	09·9	"
34·50 E.-SW. cor. lot 42	23	25	6	" 17, '14	27 17·8	"
1·70 N.-NE. cor. sec. 18	23	25	6	" 26, '14	04·5	"
30·24 S.-NE. cor. sec. 3	24	25	6	" 7, '14	26 54·6	"
30·24 S.- " 3	24	25	6	" 8, '14	58·4	"
25·00 N.-¼ cor. E. by sec. 21	5	26	6	" 22, '14	25 29·3	Jas. Gibbon.
20·00 W.-NE. cor. sec. 21	5	26	6	" 23, '14	25·0	"
54·00 S. " 14	11	26	6	Apr. 29, '14	57·2	W. H. Norrish.
24·00 S.- " 11	11	26	6	" 30, '14	26 00·4	"
51·00 S.- " 11	11	26	6	May 1, '14	25 52·2	"
4·50 S.- " 2	11	26	6	" 2, '14	48·4	"
20·00 S.- " 2	11	26	6	" 4, '14	48·7	"
23·00 N.- " 14	11	26	6	" 12, '14	53·9	"
55·00 N.- " 14	11	26	6	" 13, '14	26 02·4	"
11·00 W.- " 23	11	26	6	" 14, '14	25 58·1	"
46·00 W.- " 23	11	26	6	" 15, '14	55·3	"
46·00 W.- " 23	11	26	6	" 16, '14	54·6	"
61·00 W.- " 23	11	26	6	" 16, '14	26 00·8	"
34·00 E.- " 33	11	26	6	" 20, '14	25 48·8	"
43·60 S.- " 34	11	26	6	" 22, '14	47·4	"
70·00 S.- " 34	11	26	6	" 23, '14	53·6	"
21·20 S.- " 27	11	26	6	" 26, '14	26 09·2	"
50·00 N.-SE. " 3	12	26	6	" 29, '14	03·7	"
50·03 N.-NE. " 3	12	26	6	" 30, '14	02·6	"
30·00 W.- " 10	12	26	6	June 3, '14	07·9	"
56·00 W.- " 10	12	26	6	" 4, '14	25 55·6	"
3·00 S.- " 9	12	26	6	" 9, '14	26 01·0	"
30·00 S.- " 9	12	26	6	" 10, '14	00·3	"
22·50 N.-SE. " 4	12	26	6	" 11, '14	25 42·3	"
32·50 N.-NE. " 9	12	26	6	" 22, '14	59·1	"
60·00 W.- " 16	12	26	6	" 25, '14	59·6	"
22·00 N.- " 5	12	26	6	July 6, '14	26 12·7	"
33·40 S.-NW. " 19	12	26	6	" 10, '14	25 53·3	"
95·00 N.-SE. cor. Lytton, I.R. No. 15	16	26	6	" 10, '14	28 14·4	J. A. Calder.
45·10 N.-NE. cor. sec. 19	16	26	6	" 14, '14	26 13·1	"
65·00 N.-NE cor. sec. 19	16	26	6	" 16, '14	26 58·5	"
23·00 S.-¼ cor. N. by sec. 34	16	26	6	" 25, '14	27 01·7	"
180·70 N.-SW. cor. Lytton, I.R. No. 15	17	26	6	Aug. 1, '14	25 57·9	"
55·00 S.-NE. cor. sec. 18	3	28	6	" 18, '14	24 34·2	P. Melhuish.
At NE.-SW. ¼ sec. 12	4	29	6	July 24, '14	25·3	"
At NE.-NW. ¼ sec. 12	4	29	6	" 25, '14	44·3	"
64·38 E.-NE. cor. sec. 15	4	29	6	" 31, '14	26 09·4	"
58·11 N.-NW. " 17	3	30	6	June 14, '14	23 41·2	"
12·60 S. 15·00 W.-NW. cor. sec. 20	3	30	6	" 17, '14	43·6	"
13·52 W. 18·88 N.-NE. " 20	3	30	6	" 30, '14	22·1	"
15·72 S.-NE. cor. sec. 24	3	30	6	Aug. 21, '14	24 25·3	"
32·52 N.- " 14	3	30	6	" 27, '14	23 14·2	"
25·00 S.- " 15	3	30	6	Oct. 27, '14	21 44·7	"
63·77 N.- " 15	3	30	6	Sept. 4, '14	22 42·4	"
29·54 N. " 11	3	30	6	" 15, '14	23 44·1	"
At SE. cor. lot 8	Wrigley, N.W.T.			Aug. 11, '13	40 24·1	S. D. Fawcett.

RESULTS OF MAGNETIC OBSERVATIONS, 1914-15.—*Continued.*

Table I.—Declination Observations—Concluded.

Place.	Township.	Range.	Meridian.	Date.	Declination.	Observer.
					° ′	
	Wrigley,					
2·00 S.-cor. bet. lots 4 & 5 on base line.		N.W.T.		July 15, '14	39 37·2	S. D. Fawcett.
At I.P. Pits at E. end of N. by lot 5...	Simpson,					"
		N.W.T.		July 27, '13	37 32·8	
At NE. cor. lot 38		"		June 24, '14	32·6	"
At " 38		"		" 28, '14	34·6	"
At " 38		"		" 28, '14	32·2	"
7·60 N. 6·00 W.-¼ cor. N. by sec. 18..	5	4	7	June 8, '14	25 43·2	P. Melhuish.
At west I.P. Pits N. by lot 7	Good Hope,					
		N.W.T.		Sept. 16, '13	42 04·1	S. D. Fawcett.
At " " 8		"		" 16, '13	40 57·2	"
At " "		"		" 17, '13	41 01·4	"
At " " 7		"		" 17, '13	40 8	"
At " "		"		" 17, '13	36·9	"
At SW. cor. lot 7	Norman,					
		N.W.T.		Nov. 15, '13	40 21·5	"
At cor. bet. Lots 9 & 10 on base line...		"		July 9, '14	40 54·7	"
At " " "		"		" 12, '14	41·7	"
75·00 S.-¼ cor. N. by sec. 35	39		C	Oct. 9, '14	24 01·2	P. Melhuish.
75·00 " " 26	39		C	" 14, '14	23 29·4	"
39·00 " " 35	39		C	" 15, '14	24 11·6	"
37·65 E.-NE. cor. sec. 34	39		C	Sept. 25, '14	26 03·0	"
38·50 S. 11·10 E.-NE. cor. sec. 23	Frac. tp. 39		C	May 27, '14	43·7	"
9·20 S. 21·00 W.- " 24	" 39		C	" 28, '14	24 24·6	"
21·60 S. 18·50 W.- " 24	" 39		C	" 29, '14	26 12·9	"
38·00 S.- " " 23	" 39		C	" 30, '14	28 00·4	"

RESULTS OF MAGNETIC OBSERVATIONS, 1914-15—*Concluded.*

TABLE II.—Inclination and Total Intensity.

Station. Distance in chains from nearest post.	Township.	Range.	Meridian.	Date.	Inclination.		Total Intensity.		Observer.	Instrument.
					L. M. T.	Value.	L. M. T.	Value.		
								c.g.s.		
10·00 E. 20·00 S.-NE. cor. sec. 33.....	11	2	Pr.	July 22, '14	8·7- 9·8	78 10·7	9·1- 9·5	0·62920	E. J. Wight...	T.S. 62.
10·00 E. 20·00 S.- " 33.....	14	2	"	" 22, '14	9·5-10·5	78 10·8	9·8-10·2	0 62919	" ...	"
10·00 E. 20·00 S.- " 33.....	14	2	"	" 22, '14	10·2 11·2	78 10·9	10·5-10·9	0·62920	"	"
5·00 E. 30·00 S.- " 33.....	14	2	"	Nov. 6, '14	9·3-10·5	78 10·6	9·8-10·2	0 62996	"	"
5·00 E. 30·00 S.- " 33.....	14	2	"	" 6, '14	10·1-11·3	78 10·3	10·5-10·9	0·62993	"	"
5·00 E. 30·00 S.- " 33.....	14	2	"	" 6, '14	10·9-12 1·	78 10 2	11·3-11·8	0 62991	"	"
1·00 W.-NE. cor. sec. 28	14	2	"	July 18, '14	13·6-15·3	78 08·9	14·2-14·7	0 62899	R. C. Purser....	"
1·00 W.- " 28..... ...	14	2	"	" 18, '14	14·6-16·2	78 08 8	15·3-15 7	0 62947	"	"
1·00 W.- " 28	14	2	"	" 18, '14	15·7-17·1	78 08·8	16·2-16·6	0·62939	"	"
1·00 W.- " 28.....	14	2	"	Nov. 10, '14	10·0-11·5	78 10·3	10·6 11·1	0 62913	"	"
1·00 W.- " 28	14	2	"	" 10, '14	11·1-12·5	78 10 0	11·6-12·0	0·62876	"	"
1·00 W.- " 28.....	14	2	"	" 10, '14	12·1-13·3	78 09·1	12·5-13 0	0·62952	"	"
15·00 E. 27·00 N.-NE. cor. sec. 28 ...	9	27	"	July 26, '14	9·0-10·1	77 12·9	9·4- 9·8	0·62573	E. J. Wight....	"
15·00 E. 27·00 N.- " 28....	9	27	"	" 26, '14	9·8-10·9	77 12·7	10·1-10·4	0·62574	"	"
15·00 E. 27·00 N.- " 28 ...	9	27	"	" 26, '14	10·4-11·5	77 12·8	10·8-11·2	0·62579	"	"
20·00 W. 30·00 N.- " 22....	21	31	"	June 24, '14	9·2-10·1	78 02 0	9·5- 9·9	0·63267	"	"
20·00 W. 30 00 N.- " 22....	21	31	"	" 24, '14	9·9-10·7	78 02·1	10·1-10·5	0·63267	"	"
20 00 W. 30·00 N.- " 22....	21	31	"	" 21, '14	10·5-11·4	78 02·1	10·7-11·1	0·63270	"	"
25·00 E. 8·00 S.-NE. cor. sec. 3.....	28	17	2	June 27, '14	14·2 15·3	77 47 1	14·6-14·9	0·62962	" .. .	"
26·00 E. 8·00 S.- " 3. ...	28	17	2	" 27, '14	14·9-16·0	77 47·3	15·3-15·6	0·62966	"	"
26·00 E. 8·00 S.- " 3 ...	28	17	2	" 27, '14	15·6-16·6	77 47·5	15·9-16·3	0·62969	"	"
9·00 S. 12 00 E.- " 25	25	17	2	July 1, '14	7·2- 8·3	77 40·2	7·6- 7 9	0·62770	"	"
9·00 S. 12·00 E.- " 25.....	25	17	2	" 1, '14	7·9- 8·9	77 40·1	8·3- 8·6	0·62771	"	"
9·00 S. 12·00 E.- " 25.....	25	17	2	" 1, '14	8·6- 9·6	77 40·2	8·9- 9·3	0·62779	"	"
35 00 S. 4·00 W.- " 7.....	23	19	2	Oct. 29, '14	10·3-11·4	77 28·1	10·7-11·0	0·62616	"	"
35·00 S. 4 00 W.- " 7. ..	23	19	2	" 29, '14	11·0-12 1	77 28·1	11·4-11·8	0·62617	"	"
35 00 S. 4·00 W.- " 7.....	23	19	2	" 29, '14	11·8-12 9	77 28·0	12·1-12·5	0·62607	"	"
35 00 S. 4·00 W.- " 7.....	23	19	2	" 29, '14	13·0-11·6	77 27·2	13·6-14 0	0 62650	" . ..	"
20 00 N. 25·00 W.- " 34. ...	29	13	3	Sept. 10, '14	13·6-14·6	77 01·7	14 0-14·4	0·62599	"	"
20·00 N. 25·00 W.- " 34.....	29	13	3	" 10, '14	14·4-15·2	77 01·7	14 6-14·9	0 62600	"	"
20·00 N. 25·00 W.- " 34.....	29	13	3	" 10, '14	11 9-16·0	77 01·5	15·2-15·6	0 62604	"	"
2 00 S. 0·20 E.- " 13.....	39	13	3	Sept. 25, '14	9·2-10·3	77 42 0	9·6-10·0	0·62703	"	"
2 00 S. 0·20 E.- " 13.. ..	39	13	3	" 25, '14	10·0-11·0	77 42·1	10·3-10 6	0·62700	"	"
2·00 S. 0·20 E. " 13.....	39	13	3	" 25, '14	10·6-11·7	77 42·0	11·0-11·3	0·62709	"	"
9 00 N. 1 50 E.- " 26.....	19	15	3	Oct. 13, '14	13·5-11·6	76 35·1	13·9-14·2	0 61840	"	"
9 00 N. 1 50 E.- " 26.....	19	15	3	" 13, '14	14·2-15·3	76 35·1	14·6-15·0	0·61833	"	"
9 00 N. 1 50 E.- " 26	19	15	3	" 13, '14	15·0 16·1	76 35·1	15·3-15 7	0 61820	"	"

20 00 S.	5·00 E.	"	19.....	24	15	3	Sept.	2, '14	9·2–10·4	76 35·2	9·6–10·0	0·6247			
20·00 S.	5 00 E.	"	19.....	24	15	3	"	2, '14	10·1–11·1	76 35·2	10·4–10·7	0·6251			
20·00 S.	5·00 E.	"	19.....	24	15	3	"	2, '14	10·7–11·7	76 35·3	11·1–11·4	0·6246			
7·00 N.	5·00 E.	"	28.....	36	20	3	Aug.	10, '14	8·1– 9·2	77 22·2	8·5– 8·8	0·6253			
7·00 N.	5 00 E.	"	28.....	36	20	3	"	10, '14	8·8– 9·8	77 22·8	9·2– 9·5	0·6274			
7·00 N.	5·00 E.	"	28.....	36	20	3	"	10, '14	9·5–10·5	77 23·6	9·8–10·2	0·6261			
4·00 E.	29·00 N.	"	33.....	47	20	3	Oct.	1, '14	13·5–14·7	78 03·6	13·9–14·3	0·6481			
4·00 E.	29·00 N.	"	33.....	47	20	3	"	1, '14	14·3–15·3	78 03·2	14·6–15·0	0·6476			
4·00 E.	29·00 N.	"	33.....	47	20	3	"	1, '14	15·0–16·1	78 03·4	15·3–15·7	0·6464			

APPENDIX No. 63.

RESULTS OF WATCH TRIALS.

Name.	Number of Watch.	Escapement, Balance Spring, etc.	Mean Daily Variation of Mean Daily Rate.								Mean Error.	Diff. between m.d.r. and m. of m.d.r. at 65° F.						Mean Error.	M. ch. of r. for 1° F.	Total Marks.
			P. U. 65°	P. R. 65°	P. L. 65°	D.U. 40°	D.U. 65°	D.U. 90°	D.D. 65°	P. U. 65°	$\sim$	P.U.	P.R.	P.L.	D.U.	D.D.	P.U.	β		0–1000
Waltham Watch Co.	18991085	D.r., g.b., l.e., s.o.	0·36	0·59	0·17	0·51	0·46	0·72	0·19	0 50	0·44	+2·25	−2·21	−1·49	+0·43	+1·11	−0·07	1·26	0·02	610·1
"	17162246	"	0·33	0·70	0·32	0·60	0 46	0 49	0·21	0·18	0·41	+0·81	−0·83	−4·05	+1 63	+1·81	+0·63	1·63	0 06	539·6
"	17162252	"	0 34	0·61	0·35	0 35	0·36	0·50	0 74	0·32	0 45	+1·52	0·00	−4·04	+2 54	+0·56	−0·56	1·54	0·06	528·0
"	18121201	"	0·47	0·50	0·51	0·53	0·10	0·26	0·52	0·69	0·45	−0·33	−2·45	+3·11	+1·75	−1 27	−0·81	1·62	0 08	520·2
"	18097048	"	0·62	0·51	0 34	0·08	0·30	0 54	0·37	0 68	0·43	+1·84	−4·22	−0·46	−0·06	+2·38	+0·52	1·58	0 11	517·8
Hamilton Watch Co.	688379	"	0 22	0·59	0·55	0·59	0·50	0·61	0·36	0 35	0·48	−0·83	3·61	+2.27	+2·01	+0·73	−0·59	1·67	0 08	482·1
"	80	"	0·31	0·70	0·42	0·99	0·47	0·64	1·00	0·16	0·59	+2·71	−2·65	−0·41	+0·41	−0·83	+0·77	1·30	0·08	468·2
Waltham Watch Co.	18091100	"	1·26	0·22	0·42	0·26	0·11	0·58	0 22	1·59	0·58	+0·30	−5·50	+1·40	+0·18	+1·74	+1·90	1·84	0·06	438·8
"	1096	"	0·80	0·78	0·47	0·52	0·67	0·71	0·67	0 57	0·65	+0·55	− 0 97	−2·71	+1·71	+0·11	+1·31	1 23	0·13	416·6
"	98	"	0·61	0·49	1·22	0·91	0·56	0·50	0·34	0·40	0·63	+0·41	−3·73	+1·79	+1·51	− 1·41	+1·41	1 71	0·08	401 8
"	35	"	0·63	0·66	0·62	0·80	1·04	0 81	0·27	0·40	0 65	+3·78	− 2·58	+2·32	− 0 66	−3·10	+0·24	2·11	0·06	356·8
"	18121061	"	0·85	0·33	0·30	1·36	0 55	0 35	0·38	0·59	0·59	−0·85	−1·53	+5·29	− 1·15	+1·69	− 3·45	2 33	0·10	351·7
"	18091078	"	0·54	0·38	0·63	0 75	0·77	0 53	0·26	0·46	0 54	− 2·65	+5·45	· 6·51	+0·59	+2·75	+0·35	3·05	0·02	349·7
"	18028514	"	0·64	0·72	0·37	0·84	1·19	0·27	0·23	0·65	0·61	−1·83	− 2·23	+2·21	+4·20	+0 83	−3·18	2·41	0·10	317·4
"	18091014	"	0·11	0·12	1·36	0·67	0 38	0 21	0·34	0·60	0·47	+2·23	− 2 33	−7·25	+2 69	+2 09	+2·57	3·19	0·11	314·1
		Means.....	0 54	0·53	0·54	0·65	0 53	0·52	0·41	0·54	0·53	1·52	2 69	3·02	1·43	1·49	....	1·90	0·08	.....

APPENDIX No. 64.

Surveying Instruments on Hand, March 31, 1915.

Instruments.	In Stock April 1, 1914.	Purchased 1914-1915.	Sold 1914-1915.	Balance on hand, March 31, 1915.		Remarks.
				On loan.	In store.	
Abney levels	52		10	4	38	
Alidades		1			1	
Alt-azimuths	1				1	
Aneroids	102		8	4	90	
Artificial Horizons	4				4	
Base line apparatus	1				1	
Cameras and Kodaks	17	2		4	14	One destroyed in bush fire.
Compasses	34				34	
Current meters and logs	4				4	
Dip circles	2				2	
Field glasses and binoculars	7			3	4	
Levels	38			10	28	
Levelling rods	85	3		25	40	23 worn out on surveys.
Micrometer telescopes	8				8	
Optical squares	1			1		
Pedometers	2				2	
Photo-theodolites	5			1	4	
Plane tables		1			1	
Protractors	40			1	39	
Rod levels	19	6		8	14	Three lost on survey.
Sextants and reflecting circles	3				3	
Sidereal watches	66	1	5	3	59	
Solar compasses	2				2	
Stadia rods	20	20	18	1	18	Three worn out on survey.
Stadia slide rules	22		1	1	20	
Steel tapes	150	27	38	9	130	
Subsidiary standard measures	111	5	14		102	
Survey pickets	2				2	
Surveying cameras	4				4	
Tally registers	12				12	
Tape stretching apparatus		1		1		
Telemeters	1			1		
Thermometers	17		1	2	14	
Transit theodolites	51	35	22	4	60	
Zenith telescopes	1			1		